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FRANKS

ON THE CURE OF

DIARRHŒA, CHOLERAIC DIARRHŒA, AND DYSENTERY,

WITH PRECAUTIONARY REMARKS

ON CHOLERA.

PRICE ONE SHILLING.

A TREATISE
ON
THE CURE OF
DIARRHŒA, CHOLERAIC DIARRHŒA, AND DYSENTERY;
WITH
PRECAUTIONARY REMARKS
ON CHOLERA.

"PREVENTION IS BETTER THAN CURE."

BIBLIOTHECA · BODLEIANA ·

By GEORGE FRANKS, SURGEON.

THE SECOND EDITION
REVISED AND CONSIDERABLY ENLARGED.

LONDON:
GEORGE JOHN STEVENSON,
54 PATERNOSTER ROW, E.C.
EDINBURGH:—Maclachlan & Stewart, Booksellers to the University.
DUBLIN:—George Herbert, Grafton Street.
1866.

157 . o . 97

LONDON:
PRINTED BY WILLIAMS AND STRAHAN,
7 LAWRENCE LANE, CHEAPSIDE.

PRELIMINARY REMARKS.

THE SUBJECT of this book concerns all classes of the community — THE ASIATIC CHOLERA.— The OBJECTS for which it has been written are several—the design being to prevent undue alarm, in consequence of the disease having again visited England—to allay overmuch anxiety, in case of individual attack—to direct attention to the character of the ailments that usually precede it, and are often designated its premonitory symptoms —to explain *concisely* the various Organs or parts of the body affected by those symptoms—to describe the functions they are respectively intended to perform, in language devoid of professional technical terms, that all who read may understand—to invite the attention of the Public to a

Medicine that is calculated to check those complaints on their first appearance, and thereby to ward off an attack of Cholera, or to arrest it in its progress—a Medicine that has stood the test of extensive Private Circulation for many years, and which is now for the first time presented for Public Sale, and also to incite curiosity in the minds of general readers, whereby they may be induced to become acquainted with a subject of such paramount importance to all.

The circumstances that led to the discovery of the Medicine—the evidence to its efficiency,—Testimony elicited by a chain of events somewhat special and extraordinary, and—the reason why it is now thus launched on the current of public opinion, are detailed in the body of the work.

London, 90 Blackfriars Road, S.
January 1*st*, 1866.

PREFACE

TO THE SECOND EDITION.

ENCOURAGED by the favourable reception which has been accorded to the First Edition of this Work, the Author has now endeavoured to render it more worthy of public attention by the introduction of new matter, which, for the sake of brevity, was then omitted. Indeed, the Work may be said to be re-written; and it is hoped it will be thought to be increased both in interest and instruction. The like absence of technical language has been adopted here, as in the former Edition.

The *Lancet* of the 28th July last, states that Cholera has spread in a most malignant form over the East of London. The Registrar General designates it "a fatal Explosion of Cholera."

The Spasmodic Cholera is a subject for the most serious consideration of ALL, for the GOVERNMENT as for the PEOPLE.

The usually erratic course of this disease, and its sudden appearance in the most unaccountable manner, and in the most unlikely places, are incidents which baffle all human calculation. It seems to defy every obstacle for its exclusion. No barrier—no sanitary cordon—can prevent its approach; complete isolation seems to be of no avail; it attacks the prisoner in the cell—the female in the harem—whether on land or at sea—in the desert or on the mountain—there seems to be no escape from it. When it enters a town, whether seemingly by caprice, or whether imported by an infected person, it follows no known law of pestilential progression. It proceeds, not by regular steps from one part to another, but with a kind of hop, skip, and jump, it ofttimes settles simultaneously, and suddenly in the most distant and opposite directions. Sometimes, it stays not to secure a second victim in a family—at other times, it seems to satiate itself in one house—and goes not beyond one dwelling—occasionally, it decimates a street or a suburb; and although it generally localizes itself in the lowest hovels, amidst dirt, debauchery, and penury, yet frequently it revels in the healthiest and the most wealthy neighbourhoods.

GOVERNMENT can do much to check it on its approach, but INDIVIDUALS may do far more; for by an immediate attention to its Precursory ailments, they generally have it in their power to ward off its formidable assault. If they neglect this precaution, and wait until prostration of strength has ensued, then the case has become serious indeed.

It should be borne in mind that during the Epidemic Cholera of 1854-5 in the Metropolis, the General Board of Health framed certain instructions, which they stated to be the results of experience, as to the best means of meeting an outbreak of Epidemic Cholera.

One of the preventive measures recommended by the Board—denominated "house to house" visitation,—was based on the belief entertained by the Medical Profession, that by prompt attention to every case of Diarrhœa, the ravages of this fatal disease might be mitigated, to a large extent, among the population of a town or district visited by Cholera; and in their INSTRUCTIONS to LOCAL AUTHORITIES on PREVENTIVE MEASURES in relation to EPIDEMIC CHOLERA, under the NUISANCES REMOVAL ACTS, they said:—

"It is well known that where Cholera is Epidemic, Diarrhœa, usually painless, almost always prevails very extensively; and it is also known that Diarrhœa of the same character usually precedes, sometimes for a few hours, sometimes for several days, the alarming symptoms which constitute developed Cholera. Now the prevalent Diarrhœa, in a vast majority of cases, yields to remedial measures promptly applied; and it is believed that if they had been neglected, many cases of Diarrhœa thus arrested, would have passed into developed Cholera. As long, therefore, as Cholera shows itself so difficult of cure, every plan which proposes to deal with an outbreak of this fearful disease *must provide for the immediate treatment of all cases of Diarrhœa.*"

They also advised that—

"In rural districts, depôts of *ready prepared medicines* should be established at the houses of one or more of the most intelligent and influential residents."

The circulation of these instructions was very effective.

London, September, 1866.

ERRATUM.

In page 37, line 23, for inspiration, or breathing inwards, read—expiration, or breathing outwards.

A TREATISE

ON THE CURE OF

DIARRHŒA, CHOLERAIC DIARRHŒA, AND DYSENTERY,

WITH

Precautionary Remarks on Cholera.

ASIATIC or Spasmodic Cholera has appeared again in England. The *Times* newspaper of October the 24th thus announced it:—

"THE CHOLERA.

(FROM OUR OWN CORRESPONDENT).

SOUTHAMPTON, *Tuesday*.

It is my painful duty to report to you the death this morning, after three days' illness, from a violent attack of cholera of the worst type, of Dr. Francis Cooper, the Officer of Health for this borough. He was seized about 2 o'clock on Saturday morning, when he called his servant and requested her to go for some medical man, as he was taken very ill, and felt he should not be long here. Medical assistance was speedily in attendance, and during Saturday nearly every gentleman of the profession in Southampton saw him, and remedies of all descriptions were successively applied, but it was painfully evident from the first that the attack would in all probability have a fatal termination. His naturally strong constitution struggled manfully against the malignant disease, but notwithstanding, he gradually sunk under its ravages, and he died at 25 minutes before 1 o'clock this morning, just three days from the commencement of the attack. The deceased had, it appears, been suffering slightly from diarrhœa for three or four days previously, he having complained of it as long before as on the Monday evening to his friend Dr. Wiblin, when spending a few hours at his house."

The disease is rapidly progressing throughout this, as it has advanced through other countries. That it assumed a virulent form at Southampton is obvious; it has now manifested its malignant character in various towns in England and Wales, and it has also reached Scotland and Ireland. Nevertheless there is no cause for PANIC, or for UNDUE INDIVIDUAL ALARM. That Cholera is frequently a fatal disease is true. It is, however, also certain that it has been too much an object of intense fear; and that a great number of those who succumbed to its attacks, were the victims of uncontrolled affright. All medical practitioners of experience coincide in this opinion; and they say, that the cases of Cholera which have come under their observation in this country, have been generally preceded by some kind of indisposition, as languor—dejection—nausea—wind in the stomach and intestines—followed by—Diarrhœa,—that when these symptoms have been duly attended to, and the Diarrhœa, when it has occurred, has been controlled on its first appearance, prostration of strength has been stayed, further advancement of disease has been prevented, and the dreadful complaint of Cholera has not ensued. This fact in relation to Cholera is of great importance; its influence cannot be over-estimated. A non-observance of, or a non-attention to it, may be followed by the most disastrous consequences.*

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* Whilst this Edition was passing through the Press, the following Memorandum, prepared by the Medical Officers of the Privy Council, under the regulations recently issued by the Lords of the Council and otherwise, as one of the precautions to be taken against Cholera, was thus announced:—

"9. In places where cholera is present or threatening, one particular bodily ailment requires exceptional vigilance. That ailment is diarrhœa. For the most part in this country cholera begins somewhat gradually; so that for some hours or even days before the symptoms become alarming, a so-called 'premonitory diarrhœa' may be observed. Where cholera is tending to be epidemic, there always exists, side by side with it, in the district a large amount of epidemic diarrhœa, representing in part the earlier stages, in other part the slightest degrees, of the same infectious malady. This diarrhœa (painless and apparently trivial though it be) may in any case suddenly convert itself into cholera; and, apart from the very serious significance of the symptom as regards the patient himself, it must be remembered that every such diarrhœal patient may be a well-spring of infection to others. It also seems probable that accidental diarrhœa, originally independent of the epidemic influence, is, of all known personal conditions, the one on which the cholera-infection can most easily fix itself. And thus on all accounts it is of the most essential importance that no looseness of bowels should be neglected in places where cholera exists.

"By direction of the Lords of the Council,

"JOHN SIMON.

"Medical Department of the Privy Council,
Office, 8 Richmond Terrace, London, S.W.,
July 24th, 1866."

The Asiatic or Spasmodic Cholera has challenged the energy, the talent, the ingenuity, and the investigation of many as learned, accomplished, experienced and acute medical practitioners as ever existed. The press, not only of this, but of every other civilized nation—for all are deeply interested in the matter—has produced very valuable works, the result of the labours of those eminent persons. These works have, however, been written for the guidance of medical men, or of students of medicine, and consequently they are replete with unexplained professional terms. These for the most part are derived from the Greek and Latin languages; and, since no clue to the meaning of those terms therein appears, they are wholly unintelligible to the general reader. This is the main cause why medical works are so little read out of the profession, although they intimately concern all members of society.

The following pages are adapted for the perusal of all classes; they are intended for the information of all, since all are interested in the subject. The language used is the English language, expressed in plain terms, which every one who reads them can understand.

The history of Cholera, whence it came, by what route it has travelled, whether it be dependent on a tainted atmosphere, or upon direct infection, or if infectious whether it may be spread abroad by other means, are very proper considerations for medical inquiry. To investigate them here would be out of place, as it might divert attention from matter of much more importance to general readers; and it is for such this Work has been written.

It has been remarked that Cholera is generally preceded by certain ailments—notices of its approach. How best to profit by these, to know the cause of them, and to check them on their first appearance—how to put a stop to the Diarrhœa when it occurs, are subjects far more momentous to them; and these are the matters to which their minds are more particularly directed.

Meaning of the word Digestion.

The ailments above-mentioned are occasioned by an unhealthy state of the Organs of Digestion in the human body. By an "Organ" is meant some part which has a particular function or office allotted to it in the animal economy; and by "Digestion," the change which food undergoes, whereby it is fitted to afford nourishment, to impart strength, and to maintain the vitality of the whole system. Some acquaintance with this process of digestion is necessary for all classes. Many who, from their position and attainments, have been considered well-informed persons, have passed on from the cradle to the grave to whom the Organs of Digestion and the functions they perform, have been almost unknown. The want of such information, or the inattention to it, is but too often the cause of acute suffering, both physical and mental, of premature decay, and of early or sudden death.

All material bodies are either Organic or Inorganic. Organic bodies are such as are composed of various parts mutually dependent on each other, and all adapted to effect some special purpose; these parts are named organs, and the operation of an organ is called its function. Organic functions depend on life. Life, or vital action, communicates development, and development occasions a *change of state.*

Life may be either ANIMAL or VEGETABLE.

Animal life involves consciousness, or the power of knowing;—volition, or the power of willing;—sensibility, or the capacity of feeling; and mind, whereby the animal is enabled to remember past occurrences. The subject now under our consideration relates to Animal life; and to one *species* of animal only, MAN.

It must be borne in mind that Man differs from every other animal, inasmuch as in addition to all other animal endowments, Man possesses the capacity of reasoning—the faculty of speech, as exemplified in language—and that his being a reasonable and a reasoning creature, has a most important bearing on the present inquiry.

Organs of Digestion are Organs of Nutrition.

Since by digestion is meant the change which food undergoes until it is in a fit state to nourish the body, the Organs of Digestion may be termed the organs of nutrition; nutrition being the completion of the Assimilative functions.

In order to describe the Organs of Digestion, and to explain the several offices which they respectively perform, it is not necessary to consider the structure of the whole human frame; but since the functions of the animal body are so intimately connected, that none can be suspended without effecting a cessation of the proper action of the rest, and as the properties of all the tissues, and organs, are governed by the regular nutrition conveyed to them by a due supply of perfectly assimilated food, that is, of food converted into healthy blood, it is necessary that the organs should be not only healthy, but that they should perform their functions with regularity. These requisites bring other organs of the body into action, on the proper exercise of which depends the due regularity of the performance of the functions of the Digestive Organs. They are organs of secretion—absorption—sensation—contraction—extension — circulation—and respiration. These organs will be respectively described and explained as we proceed.

Since it is by food that the body is maintained, and as it is so maintained by this food being converted into blood, and then changed into its component parts, the main subjects for our consideration will be, what is meant by the term "Food?" Which are the organs of the body that effect these important changes in its condition—in what manner they respectively conduce to complete this alteration—what are the ailments produced by a non-completion, or by an insufficient performance of their respective functions; and when this occurs, what is the proper mode of remedying the evil?

By "food" is meant the solid and fluid substances taken into the mouth, usually called meat and drink.

The solid part being first masticated or chewed by the teeth, is by this process exposed to a fluid,* which flows from certain small organs of secretion, situate in the mouth;† it is reduced to a pulp, and in this state it is

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* The saliva. † The glands, or mucous membrane.

Meaning of the Organs of Secretion.

Glands and their composition.

Meaning of the Organs of Excretion.

easily swallowed. Organs of secretion are such as create or develop special fluids from the blood; hence they are called secreting, or separating organs;—some of these are named glands. GLANDS are of two sorts: conglobate* and conglomerate.† A Conglobate gland is a smooth body, enveloped in a fine skin, by which it is separated from all the other parts, only admitting an artery or nerve to pass in, and giving way to a vein and excreting canal to come out. A conglomerate gland is composed of many small conglobate glands all tied together. Glands are very numerous, they are situate in various parts of the body, and are composed of its tissues, blood vessels, nerves, &c.; they are of two kinds, being either Secreting organs, or organs of *supply*—or Excreting organs, or organs of *waste*. By excreting organs are meant, such as separate and carry off the fluids from the blood that are supposed to be either useless, or detrimental to health.

The Gullet.

The Alimentary Canal.

By the act of swallowing, the food is passed from the mouth into the Gullet,‡ a fleshy canal which extends to the Stomach, and which may be called the first part of the alimentary canal. The Alimentary Canal is the entire passage through which the aliment or food passes, from its entrance into the mouth until it is voided as excrement.

The Stomach.

The STOMACH is situated in the middle region of the body,§ and is an expansion of the alimentary canal. It is composed of three coats or membranes; the outermost, the muscular, and the innermost. The outermost is very firm, and is formed by the membranous lining of the abdomen;* the muscular is the seat of the extraordinary sensibility to which the stomach is liable; the innermost coat is covered with glands, arteries, veins, and nerves; and absorbent vessels are distributed throughout its surface. These organs will be respectively noticed, and their functions explained, as they severally pass under consideration.

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* From *Conglobo* (to coalesce into a round mass).

† From *Conglomero* (to gather into a ball). ‡ The œsophagus.

§ The epigastrium.

The Gastric Juice.

The Stomach is sometimes emphatically called THE Organ of Digestion; although the process of digestion is not completed there. It is in the stomach that the food comes in contact with a liquid called the *gastric juice*, which is secreted therein, and is only so secreted when food is introduced; it is the most powerful and the most active natural solvent with which we are acquainted. This juice contains an acid and a peculiar nitrogenous material named Pepsin; it exerts a chemical action on the food, and, assisted by a constant undulatory agitation of the coats of the stomach, and by a mucous membranous secretion that is secreted in the stomach when it is empty, it changes the food into an oily, gelatinous, saccharine compound mass of a greyish colour, called CHYME. This is usually called the FIRST STAGE in the process of digestion.

The Chyme.

The *First* Stage in the Process of Digestion.

It has been stated that the animal body possesses a natural property called the vital power. When this is enfeebled—the chemical action of the secretions is interrupted—the proper mixing of the materials is prevented or retarded—the due exercise of the stomach is disturbed or restrained—its fluids are poured forth, either too sparingly, or in too great a quantity, they become altered in their quality, and are thereby rendered either more or less inoperative.

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* The peritoneum.

It is necessary for the purpose of digestion that the gastric-juice should be permitted to come into contact with the food, and that it should operate upon every portion of it. This will be impossible unless the food has been properly chewed and mixed with the fluids in the mouth; this not being done, is frequently one cause why many persons suffer the unpleasant consequences of indigestion (dyspepsia); they have not borne in mind that teeth are intended, not only for ornament, but for use.

The Stomach is sometimes called the seat of universal sympathy, from the intimate connexions which the Organs of Digestion maintain with other Organs, and sets of Organs of the Body. There are few complaints in which this Organ of Digestion does not evince some sympathetic affection; any depressing passion may derange it; anxiety is a frequent cause of Stomach complaint; and restored mental tranquillity will often conduce to restore health. It, therefore, necessarily follows that other parts of the system must, in numerous instances, be associated with affections of the Stomach.

The Stomach is plentifully supplied with nerves; and this accounts for its extreme sensibility to contingent influences—whether external, internal, or mental—to the various states of the atmosphere, to the state of the food, or to the influence of passing events. The use of the Stomach, is to receive the food from the gullet, and to retain it, until by its admixture with the fluids secreted therein, and by other agencies, such food is rendered fit to pass its right orifice,* and to enter into the intestines.

The use of the Stomach

The Intestines.

The INTESTINES extend from the Stomach to the seat of the body, and are respectively denominated great and small; and the coats of the small intestines are similar in their character and uses, to those of the Stomach; for as the GASTRIC JUICE is secreted in the Stomach, so is a juice named the INTESTINAL JUICE secreted in the small intestines.

The Intestinal Juice.

On leaving the stomach, the food passes into the first portion of the *small* intestines,† the inner surface whereof is covered by a membrane, presenting a number of folds, by which it admits of either extension or contraction; and here the food, so mixed, comes into contact with two fluids which have been poured into it from other sources, the one having originated in, and flowed from the Liver, called the Bile, the other from an organ named the Pancreas (in animals this part is usually called the Sweetbread), and two other fluids which are secreted in the part itself, one the Intestinal Juice, and the other named the mucous membranous secretion. These fluids contain much unhealthy material, and their combination with the chyme changes its whole character; it now becomes a compound mass of offensive, impure, fœculent matter, named CHYLE. This may be termed the SECOND STAGE in the process of Digestion.

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* The pylorus.

† The duodenum.

The Chyle.

The *Second* Stage in the Process of Digestion.

The grand purpose of Digestion is the assimilation of the food; that is, the fitting it to nourish, strengthen, and support the body. To effect this, the nutritious parts of this compound mass must be separated from those which afford no nourishment; and the wholesome ingredients from those which are injurious to health. This is now done, and in this way.

The purpose of Digestion.

The larger portion of the nutritious part of this mass of healthy and unhealthy matter is absorbed or sucked up in a fluid state, and passes from the intestines by means of numerous and minute vessels or small tubes that line their inner surface or walls; these tubes take their name from the office they perform, and are called Organs of Absorption, or Absorbents.*

The portion of the food which remained in the small intestines, is thence passed on to the lower and larger bowels; any part of its nutritive matter that may be left therein, is taken up as it passes by the small absorbent vessels† to which it is exposed in its passage, and the residue is discharged as excrement.

Meaning of Absorbent Vessels.

Absorbents are two distinct sets of vessels, which suck up and convey their fluids to a great duct or conduit pipe, formed by the junction of the absorbent vessels, called the

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* From *Absorbo* (to suck up).

† The lacteals and the lymphatics.

Thoracic duct—they are the *Lacteals*[*] which take up the Chyle from the inner coats of the intestines, and are so called, from the milky appearance which the fluid thus developed by them is made to assume—and the *Lymphatics* which take up their fluids in a watery form, called Lymph.[†] These vessels form larger tubes or trunks as their course is extended; at length these trunks all meet, and pour their contents into a receptacle[‡] that receives its name from the office it performs in relation to the Chyle. This reservoir is merely an enlargement of that duct. The contents of those *Lacteals* and *Lymphatics*, viz. the nutritious parts of the food so separated from that compound mass of impure fœculent matter, flow thence into a certain large vein[§] of the body, and there become mingled with the current of the VENOUS blood, which is passing on its way to the heart, whence it flows to the lungs, there to be cleansed from its impurities, and to be converted into healthy, nutritious ARTERIAL blood.

Before we can understand how this change is effected, we must obtain a correct notion of what is termed the Circulation of the Blood, since there is no part of the tissue of the Body that does not contain blood, and that is not formed by it.

To do this, we must make ourselves acquainted with two other organs of the body that act upon and influence the organs of circulation, and without which the circulation of the blood would be impossible. These are named respectively NERVES and MUSCLES.

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[*] From *lac* (milk).

[†] From *Lympha* (water).

[‡] The receptaculum chyli.

[§] The subclavian vein.

To consider the nervous system in all its bearings would occupy too much space, and moreover it is not necessary in the present inquiry. It is sufficient to mention that the nervous system is constituted of the brain, the spinal chord, nerves, and ganglions, or nerve knots. The nervous system may be arranged under two classes of division, according to the functions which each class of nerves have severally to perform. These are nerves of motion, and nerves of sensation: nerves of the first class cause muscular contraction, and are organs of volition, or of the will; the others cause feeling, and are organs of sensation.

The Nervous System.

The Nerves.

NERVES[*] are white cords arising from the brain or from the spinal chord,[†] which is contained in the hollow part of the bones of the back;[‡] and they are distributed in pairs throughout all parts of the human body.

The brain and the spinal chord form independent centres of nervous power, and the spinal chord is united to the brain.

The greater number of the nerves arise in the spinal chord, and by a subdivision into two parts or roots, they have a twofold effect; one root passes to the posterior part of the spinal chord, and has a nerve knot,[§] a small nervous centre, or enlargement in the course of a nerve attached to it. This confers sensation alone;

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[*] From *Nervus*, a string.

[†] Medulla spinalis.

[‡] Vertebræ.

[§] Ganglion, or little brain.

the other root goes to the anterior part of that chord, and produces motion alone.

There is a set of nerves which have their roots in the spinal chord, called EXCITO-MOTARY NERVES. These nerves are exceedingly excitable; and these sensibilities or states of excitement pursue their course principally from internal surfaces to that upper part of the spinal chord which unites with the brain itself; while the motor nerves, or nerves which produce motion, pursue a REFLEX course from the spinal chord to certain muscles upon which they act. The nerves which produce sensation may act voluntarily, as they may be influenced by the will; but these nerves are always excited. The excitability of these nerves is specially marked by reflecting their action, when excited, from this part of the spinal chord to the particular muscles or organs of motion on which they are intended to operate, for example, on such muscles as are employed in the act of conveying the food into the stomach, or on those by which that portion of it which is not suitable for the nourishment of the body, is ejected therefrom.

Nerves that extend to the respiratory organs, and which are essential to the act of breathing, are called respiratory or breathing nerves. There are also sets of nerves named the *sympathetic nerves*. These nerves are peculiar to the viscera of the chest and the abdomen; they consist of a chain of nerve knots;* and they extend along the side of the backbone, from the head to its lowest extremity, and communicate with all the other nerves of the body, exciting a sympathy between the affections of its different parts, and exercising a powerful influence on all the organs of *digestion*, as also on the various other organs by which the functions of the body are performed.

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* Ganglions.

Nerves convey impressions to the brain; the brain communicates with the mind; the mind influences the will; volition and sensation are not effected by the same nerve.

Nerves possess distinct and appropriate functions corresponding with the parts of the brain or spinal chord, with the rocts of which they are respectively connected. If, therefore, a nerve seems to perform more than one function, it is a sign that it has more than one origin, either in the brain, or in the spinal chord whence it proceeds, and that in fact it consists of several nerves joined together.

That the nerves which are acted upon by the will and conduce to muscular action, and the nerves that produce sensation, are different nerves, that action is caused from within, and proceeds *from* the brain, and that the sensation of feeling of bodily pain is caused from without, and is carried *to* the brain, is thus exemplified.

A man may be excited by some word, or action of another, so that it creates anger and the consequence is, a blow; by this act of volition, a motion of the arm is occasioned; the effect originated from a cause which influenced the mind, and the mind influenced the will. The provocation, operating on the brain, was communicated to the nerves; the nerves acting upon the muscles, caused them to contract, and then came the blow. This effect was produced by a cause emanating *from within.* If the blow be returned, it is received on the nerves that are expanded on the skin, and conveyed by them to the sensorium,* that part of the brain which is the seat of the sensation, and the mind becomes at once sensitive to pain. Here the nervous effect is produced by a cause which originated *from without:* the muscular contraction is produced by nervous power acting on a nerve in one direction, and the pain, by its being communicated by a nerve acting in an opposite direction.

The Muscles.

MUSCLES are organs of motion; they constitute the *flesh* of animals; they consist of beaded or cylindrical fibres without branches; and they are arranged parallel to each other in little bundles.† These fibres do not contain blood-vessels; but blood-vessels run along side by side of them, and fill up the very small intervening spaces, so that each fibre is in close connexion with a blood-vessel. These arteries and veins are so very minute, as to resemble hair in their size, and hence they are called capillaries.‡

Muscles possess two properties: CONTRACTILITY,§ by which their fibres return to their former dimensions, after being extended; and IRRITABILITY,|| by which these fibres shorten on the application of a stimulus.

Their forms may be either long, broad, or short; and each of these kinds may be either simple, or compound. Muscles may be divided into the VOLUNTARY, or those which are subject to the will, as the muscles of locomotion; the INVOLUNTARY, or such as act independently of the will, as those of the heart, stomach, &c.; and the MIXED MUSCLES, or those which act imperceptibly, but yet are subject more or less to the control of the will; as the organs of respiration.

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* From *sentio* (to perceive). † Fasciculi.
‡ From *capillus* (a hair). § From *contraho* (to draw together).
|| From *irrito* (to provoke).

The contractile power of muscles on the application of a stimulus, depends on the nourishment conveyed to them by the blood. The nourishment is in proportion to the supply of pure blood; and in proportion to the nourishment, is the power of the muscle. Without such supply, the muscles would be inoperative; but being nourished with a due portion of blood, the action of the muscle increases its flow; and the more a muscle is exercised, the more powerful does it become.

Muscles have fibrous cords, of a brilliant silvery appearance, at their extremities; by these the muscle is attached to the bone, when so connected. They are called TENDONS: this brilliancy is occasioned by tendons not being so intimately connected with blood-vessels as the muscles; for it is to the purity of the blood in the capillaries, that the bright red appearance of the muscle and flesh in healthy animals may be attributed. Muscles are in such close and intimate connexion with nerves, that they may be said to be constant companions; their importance in relation to the proper discharge of the functions of other organs of the body, is obvious; for muscles and nerves operate as

Tendons

the main springs of all. This description of them, although concise, will serve, it is hoped, to give the reader a clear, if not a full notion of their mode of operation on the whole system. If so, he is now enabled to comprehend the actions of the Organs of Circulation.

Meaning of the term Circulation of the Blood.

By the Circulation of the Blood is meant its flow through the heart, the arteries, and the veins. All the blood proceeds from the heart. There are, however, two distinct sorts of blood in the body, the one, pure and healthy, of a beautifully bright red colour, approaching to scarlet, called ARTERIAL; the other, unhealthy, impure blood, thick, of a dark red colour, almost purple, called VENOUS blood. There are, therefore, two separate canals through which they respectively flow, and they are named ARTERIES, and VEINS.

Arteries and Veins.

An Artery (what).

An Artery is a membranous, pulsating canal that proceeds from the heart, and gradually becomes less as it continues its course. It is composed of three coats: a common external membranous coat, a muscular middle coat, and an internal coat, which is very smooth. Arteries are only two in number, and these originate in the heart; the one in its right side, and the other in its left. Their termination respectively is either in the veins, or in the small, hair-like capillary vessels,* or they run one into the other. The *distinction* between artery and vein, is lost at the point of union. It is by the means of arteries that the blood is conveyed *from* the heart to

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* The capillaries.

Its use. every part of the body. And this is their Special Function.

The action of the arteries, called the pulse, corresponds with the action of the heart. Their elasticity, which enables them to yield to the intermittent flow of blood thence impelled into them, admits of this concurrent pulsation. They are supplied internally with numerous valves. The use of these valves is to prevent the blood from flowing back towards the heart during its passage; they, of course, open in a direction *from* the heart.

A Vein (what). A Vein is also a membranous canal: it does not pulsate; it becomes larger as it proceeds; and it returns the blood from the Arteries *to* the Heart. Veins originate in the extremities of the arteries, or in the capillary vessels; and they terminate in one of the cavities of the heart.* Like arteries, they have three coats; but these are more slender than those of the arteries; and many of them are supplied internally with valves.† The Special Function of veins is to return the blood *to* the heart, and therefore the valves open *towards* that organ. Its use.

Whenever the blood runs in the direction of its weight, it passes with greater facility; the contrary takes place when it flows against the direction of its gravity. In the abdomen, the veins are subject to the alternate pressure of the midriff, and of the abdominal muscles; and this pressure is favourable to the flow of the venous blood in this part of the body. We must, therefore, notice the relation of these accessory causes to the situation of the veins; where these causes are strongly indicated, the veins have not valves, and the sides are thin; as in the abdomen—the chest—the cavity of the skull, &c. Where such accessory causes have less influence, the veins possess valves and have thicker sides; where they have little or no influence, as in the veins under the skin, the valves are very numerous, and the sides of the veins have considerable thickness.

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* The right auricle.

† From Valvæ (folding doors).

The Heart (what).

THE HEART is the central organ of circulation; it is enveloped in a membrane,* and is essentially a Muscular Organ. It is endowed in an eminent degree with the property of irritability, or the action which arises from a stimulant acting upon its fibres; and to this property the contact of blood with the membrane that lines its cavities seems to be the usual stimulus, and, in common with other muscles, its contractility can be sustained for a considerable time, only by a supply of *Arterial* blood to its tissues. It is in the heart that the main trunks of all the blood-vessels unite.

The Heart is situated between the right and the left lung, and is divided externally into a *base*, or its broad part, a *superior* and an *inferior surface*, and an *anterior* and a *posterior margin.* Internally in MAN, it consists of four cavities, viz., TWO AURICLES† and TWO VENTRICLES,‡ and is for that reason called *double;* they are named respectively *right* and *left*. The former receive their name from a similarity in shape to the ear; the latter, from their resemblance to a bag or pouch, such as the stomach.

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* The pericardium.

† From *auris* (the ear).

‡ From *venter* (the belly or stomach).

The *right auricle* is a muscular sac* or bag, in which are *four apertures*, two, of two large veins;†—an opening into the right ventricle, and the opening for a vein called the Coronary vein.

The *left auricle* is a similar sac, in which there are *five apertures;* those of the four pulmonary veins, and an opening into the left ventricle.

The Ventricles are divided by a fleshy septem‡ or boundary. Each ventricle has two orifices; the one auricular, through which the blood *enters* from the *auricles*, the other, arterious, through which the blood *passes out* of them to the *arteries*.

AURICLE does not communicate with auricle, nor VENTRICLE with ventricle; but the right auricle with the right ventricle, and the left auricle with the left ventricle. These four orifices are supplied with valves: they receive their names from their seeming resemblances; those at the arterious orifices are called semi-lunar§ valves; those at the orifice of the right auricule, tricuspid;|| and those at the orifice of the left auricle, mitral.** There is another valve situate just within the right auricle, at the termination of the vena cava inferior, called the Eustachian Valve, from the name of its discoverer. The internal surfaces of the auricles

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*From *saccus* (a bag). † *venæ cavæ*.
‡From *sepes* (a hedge). §From *semi* (half) and *luna* (the moon).
||From *Tres hæc tria, plural* (three), and *cuspis* (a point).
** From *mitra* (a mitre).

and ventricles are invested with a strong and smooth membrane, which is extremely irritable.

The blood-vessels of the heart may be divided into two classes, *common* and *proper*. The common are, first, the aorta, which proceeds from the left ventricle; second, the pulmonary artery, which proceeds from the right ventricle; third, the four pulmonary veins, which terminate in the left auricle; fourth, the two veins, named venæ cavæ, which empty themselves into the right auricle. The *proper* vessels, or such as have their use confined to the heart, are, first, the coronary arteries, which proceed from the aorta, and are dispersed throughout the heart; second, the coronary veins, which return the blood from the coronary arteries into the right auricle.

As the heart is muscular, it has, necessarily, numerous nerves influencing its muscles; and thus the continual action of the heart is maintained, as it receives and passes the blood, causing it to expand and contract; whereby each of the cavities of the heart assumes two opposite conditions alternately. Whilst receiving the blood, its cavities are extended, and in propelling the blood, they are contracted; by this contraction they are closed, and all the blood therein is forced out; on their opening again the blood flows in. Thus, when the left auricle is filled and extended by the reception of the arterial blood from the pulmonary veins, it suddenly contracts, and by expelling the blood it becomes empty; just at this juncture of time the left ventricle is in a condition to receive it. The contents of the distended auricle are, forced into the empty ventricle, by its muscular contraction, and fill it, and in like manner when the right auricle is filled by the flowing into it of the venous blood from the venæ cavæ, which bring it from every part of the body, the left ventricle is empty: the muscular contraction of the sides of the auricle causes it to close, and thereby the blood is forced into the right ventricle; the muscular action of the ventricles contracts them alternately, in the same manner, and so the blood is propelled through the blood-vessels of the body.

Thus there are two systems of arteries: one originates in THE PULMONARY ARTERY, which has its trunk in the right ventricle, and its extremities in the lungs; the other, in THE AORTA, which commences in the left ventricle, and whose extremities pervade the remotest parts of the system.

The blood is conveyed from the lungs to the left auricle of the heart by four channels,* which have this as their common terminus; and thence it flows into the left ventricle. The blood is returned to the heart from every part of the body, and enters the right auricle by the following channels:—A vein called the vena cava *superior* conveys it from the head, neck, chest, and the superior extremities; a vein called the vena cava *inferior*, which conducts it from the lower parts of the body, and the inferior extremities.

As there are two systems of Arteries, there are also two systems of Veins; the one originates in the extremities of the arteries in all parts of the body, and terminates in the *right auricle* of the heart; the other arises in the extremities of the Pulmonary Artery in the Lungs, and terminates in the *left auricle.*

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* The pulmonary veins.

The regularity of the route of the blood, and of its passage through the cavities of the heart is secured, and any retrograde motion is prevented, by means of valves, so placed at the principal openings of those cavities as to permit the blood to pass on; but they become expanded like a sail against it, on its attempting to flow backward, then the valves close, and the blood continues its proper course.

The circulation of the blood through the heart, the arteries, and the veins, is therefore twofold; viz. the passage of the blood from the right side of the heart through the pulmonary artery to the lungs, and back to the left side of the heart through the pulmonary veins, called the *lesser circulation;* and the passage of the blood from the left side of the heart through the arteries of the body, back again through the veins to the right side of the heart, is named the *greater circulation.*

Having now become acquainted with the mode of the circulation of the blood, and with the respective functions of arteries and veins, we can the more readily understand the nature, and the operation of the LACTEALS and the LYMPHATICS; and as it is these organs of absorption which suck up the nutritious parts of the food, and convey it to the blood, they demand our careful attention.

Lacteals (their origin).

Lacteals are numerous small tubes having cellular mouths; they originate in the mucous membrane of the intestines, and there only.

Mucous is one of the most important fluids in the human body. It is secreted by the glands of the MUCOUS MEMBRANE, a thin expanded substance composed of cellular tissue, the elastic fibres of which admit of great pliability; and it serves as a lining to the whole alimentary canal, as also to the gall-bladder and other expansive organs in the body; and the mucus is intended as a protection of the parts exposed to external influences, such, for instance, as the food in its passage through the alimentary canal, &c. The mucus secreted in the mouth, gullet, stomach and intestines, also assists in promoting digestion.

Lacteals are very tender and transparent vessels, possessed of a very great number of valves, which give them a knotty appearance, when distended with chyle. They commence in the internal surface of the mucous coat of the small intestines, perforate the other coats, and form a kind of net-work, whilst the greater number unite one with another between the muscular and external coats; thence they proceed between the coats of the mesentery or membrane, which connects the small intestines and the posterior wall of the abdomen; and passing on, they unite with the lymphatics of the lower extremities, and of those which proceed from the intestines; and these form the common trunk,—the thoracic duct, which thus becomes enlarged at its origin as before mentioned.

Lymphatics ´where tuate).

Lymphatics are also small vessels, having cellular mouths; they resemble lacteals in their structure and function; but they are much more numerous and more universally dispersed throughout the body. They arise principally from cellular membrane, and are not only found in the intestines, but also in almost every part of the system,—in every part at least where there is moisture.

The thoracic duct, the great trunk of the absorbents, is of a serpentine form, and its size is about the diameter of a crow's quill; it extends from the midriff to the angle formed by the union of the subclavian and jugular veins; and, as before mentioned, it pours its contents into the subclavian vein. This duct is a membranous canal, having an external and internal coat, the latter being supplied with valves. The reason for this is obvious; for as it terminates in a vein, its action must be assimilated to that of a vein; that is, its fluid contents must be able to flow on without being subject to *a reflux* or backward course. Moreover, a valve is placed at the entrance of the thoracic duct, where the contents of the lacteals and lymphatics are forced into it; and this valve serves two purposes. It prevents the influx of blood from the vein into the duct, and it regulates the flow of chyle into the vein, so that by this arrangement the chyle is prevented from communicating with the blood too rapidly, or in too great a quantity, whereby the flow of stimulus to the heart might excite a too violent action, and the proper assimilation of the food into blood might be either retarded or prevented; for it will be remembered as before noticed, it is here the food and the blood first meet, and that this blood is impure venous blood, on its passage to the heart, whence it is to be propelled to the lungs, there to be cleansed of its impurities. This current of venous blood and chyle flows on from the subclavian vein to the heart through another vein,* and thence it is impelled to THE LUNGS by the muscular action of the right ventricle through a vessel called an artery, although conveying venous blood, because it proceeds *from* the heart, and this is named the pulmonary artery.

The Lungs.

THE LUNGS are two organs situated in the chest, and it is by their means that we are enabled to breathe. The lung in the right cavity of the chest is divided into three lobes; that in the left, into two. The lungs hang, in a manner, from the windpipe,† which, having entered the chest, is bifurcated or divided, as by a fork, into two trunks; and these are the more and more ramified, the more deeply they penetrate into the lobules‡ of the lungs and at length they terminate in those cells§ or cavities which form the chief part of the substance of the lungs, and alternately receive and emit the air we breathe. These cells are innumerable, and they vary much both in their shape and in their magnitude; they are surrounded with, and connected by a delicate cellular membrane; this cellular membrane is supplied with numerous blood vessels, which form an extraordinary network, penetrating the mucous web which surrounds the air-cells, so that the great quantity of blood which exists in the cells of the lungs is separated from the contact of the air by this membrane only.

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* Vena cava superior.

† The trachea.

‡ The small lobes of the lungs.

§ The air cells.

The lungs thus serve to expose an immense surface of blood to the air: by this exposure, at each respiration of the breath the carbon which is in the blood *escapes*, and at each inspiration the oxygen or life-giving property of the atmosphere *unites with* the blood, and it thereby becomes *Healthy arterial* blood, and in this state it passes by certain veins* into the heart, again to be circulated through the body.

Their Use.

THE LUNGS possess considerable elasticity; this gives them the power of contraction and dilatation, which is effected, for the most part, by the action of the midriff, assisted by the muscles that act upon the ribs. The Midriff† is a muscle which runs across the body in an oblique form, and completely separates the contents of the Chest—the cavity which contains the Heart and Lungs—from the contents of the Abdomen;‡ it is convex above, and concave below: when we inspire or take a breath, this muscle changes its upper surface from the form of a high arch to nearly a plane surface, and the ribs being raised by their muscles,§ the cavity of the chest, in which, as we have seen, the lungs are situated, is thus enlarged, and affords room for expansion or dilatation of the lungs. In the act of inspiration, or breathing inwards, the midriff assumes the convex form, the muscles of the ribs contract, and draw the ribs closer together, whereby the cavity of the chest is diminished; a portion of the air in the lungs is exchanged by every successive act of breathing; thus, therefore, the moving power of the lungs consists in the bones, cartilages, and muscles with which they are connected. A middle-aged or full-grown individual draws his breath, about eighteen times every minute, when in health, and at each act of breathing a pint of air is introduced into the lungs; in taking a full, deep breath we may completely fill the lungs; but in letting our breath go back we can never quite empty them—this would be fatal to life. The air that is given out in one act of breathing is not more than about one-fifth of what is retained. To meet and appropriate such a large quantity of air thus taken into the lungs every time we breathe, the heart supplies the lungs with about two ounces of blood at each pulsation, or above one gallon in every minute. It has been remarked that the lungs are composed of innumerable minute air-cells; some of these are, therefore, necessarily in a more or less remote situation from the atmospheric air.

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* The pulmonary veins.

† The Diaphragm.

‡ The belly.

§ The inter-costal muscles.

The means by which this use is effected.

It must be noted that all gaseous substances do not unite by a chemical combination, and this is the case in the interchange of oxygen and carbonic acid, between the air, and the blood in the lungs. To insure the air in the remoter cells of the lungs being duly renewed, a principle is called into action which is common to all gaseous substances that do not chemically combine when brought into contact, and that is, *the law of mutual diffusion*. It is by the operation of this law that an entire change takes place between the carbonic acid contained in the blood when it reaches the lungs, and the oxygen in the air, by which that venous blood is purified; and the very delicate membrane which covers these cells is no impediment to, but tends to carry out that law. By mutual diffusion is meant the different disposition of gases to interchange *particles* by mere mechanical action and without altering their natures or qualities.

We have now traced THE FOOD from its being conveyed into the mouth, until its conversion into pure blood. THIS IS THE LAST AND FINAL STAGE OF DIGESTION.

Last Stage in the Process of Digestion.

By the action of the lungs, the blood thus purified passes by the four pulmonary veins to the heart, again to be circulated throughout the body. These vessels are called veins, although conveying arterial blood, because the blood flows through them *towards* the heart.

Whatsoever is subject to growth is also liable to decay and decomposition. The body grows; this growth is produced by nourishment. The renewal which the various tissues of the body are undergoing counteracts this decay, provision must therefore be made for gradually disposing of and conveying out of the body all injurious, decomposing substances that may be prejudicial to health; this is as necessary for the maintenance of the system as is the supply of the new material.

The veins take up a large portion of incipient decomposition and convey it to the various organs of secretion, whose special functions are to secrete it and carry it off from the body. The most powerful, the most incessantly active agent in the production of decay in animal substance, is *carbonic acid;* it is also the most speedy in its accumulation in the human system. We have seen that when the blood reaches the lungs the carbon that then remains in it is exchanged for oxygen, and thence it passes off into the atmosphere as carbonic acid.

Carbon is combustible. Animal Carbon contains the pure inflammable principle of charcoal. Many ounces of carbon are daily rejected from the lungs as carbonic acid by every individual. It is impossible that combustible matter can thus be disposed of without the disengagement of a considerable amount of heat, as much heat in fact as if it had been burned in a fire-grate. This heat is manifested by the elevation of temperature which the animal frame always possesses above that of the surrounding atmosphere; an elevation of temperature always in direct proportion to the amount of nervous and muscular energy of the animal, and to the vigour of its respiration, but never in any case is it altogether absent. This oxidation, the burning of the substance of the body, or in other words, tho change of matter indispensable to vital action, the combustion of nitrogen and carbon in the blood, takes place, not in the lungs, but in the capillary vessels of the whole body. Here is the fire-chamber, where the fuel is consumed, which sets in motion and propels the whole machinery of life; for *the internal capillary combustion is the source of animal heat.*

Every part of the body where blood-vessels exist, or where nervous influence operates,—every organ and tissue in the system, muscle and membrane, brain and nerve, waste away as a burning taper. They are consumed, and they pass from it gradually, but with certainty; and where no means are at hand for repairing these hourly and daily losses, the individual wears away. He dies more slowly, but not less surely, than does a martyr at the stake. He is actually burned to death; but it is at a low, instead of at a high temperature. The various constituent parts of the body successively disappear, first the fat, as being the most combustible, then the muscles shrink, soften, and decay. At last the substance of the brain becomes affected, and delirium or frenzy closes the scene. This is STARVATION.

There is, however, another organ employed to effect the purpose of getting rid of carbon from the blood, and also of other impurities which it may have contracted in its circulation before it reaches the lungs, and that is THE LIVER.

The Liver.

The *liver* is the largest glandular apparatus in the human body; it is situated in the right side under the Midriff.*

The Liver is divided into two principal parts, called lobes; and these are designated respectively as right and left: it is kept in its position by a number of Ligaments,† and by the vessels or tubes which enter it and proceed from it; it is one of the most important organs of the body. It is the receptacle into which a large vein‡ (which is the trunk of all the veins of the Digestive Organs), conveys the venous blood from the stomach, the midriff, the coverings of the bowels, and from the veins of many other parts of the body. This great vein is situate at the entrance of the Liver, and carries the venous blood into its substance, and it is from this dark venous blood that the bile is formed. Connected with the liver is an organ called the Gall-bladder; this is a membranous receptacle for bile, and is lodged in a fissure in the under surface of its right lobe.

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* The diaphragm. † From *ligo* (to bind). ‡ The vena porta.

The Bile. The Bile is the peculiar secretion of the liver, and is commonly called the gall; it is secreted in its glandular substance, and is of a bitter taste. The organs that secrete this fluid terminate in very minute canals or tubes called "biliary ducts," and these biliary ducts pour their bile into another duct*—a part passes on to a third duct,† and thence flows to the small intestines as before mentioned. This is called *hepatic* bile; the other part regurgitates, or is thrown back into the gall-bladder through a duct called the cystic duct; and is named *cystic* bile.

Hepatic bile cannot flow into the small intestines‡ except while digestion is going on, for the duodenum contracts when empty; and, therefore, it necessarily flows back into the gall-bladder.

In health the action of the liver is constant—the flow of the bile is continuous. When the bile is greater in quantity than is actually wanted in the bowels, it thus accumulates in the gall-bladder, and thence it is dealt out as it may be needed; if that flow be obstructed, all the Digestive Processes become disordered. The bile assists in converting the chyme into chyle, it aids

Its use.

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* Ductus hepaticus. † Ductus choledochus. ‡ Duodenum.

digestion by rendering more soluble the fatty matter that is contained in the food, and also in many other ways. By its flow it withdraws carbon and other impure and noxious ingredients from the blood, which, if not removed, would be the cause of very injurious, if not of fatal effects.

The Use of the Liver.

The function of the liver is twofold; it separates from the venous blood a large quantity of superfluous carbon, which has been acquired in its circulation through the tissues of the body; and it combines that carbon with other matter into a secretion which, as we have seen, is of great importance in the digestive process, viz. —THE BILE.

The circulation of the blood *in* the liver, is called the Portal or Hepatic* circulation; this is not kept up by a distinct impelling organ having pulsating arteries, such as the heart;—for it is venous blood when it passes through the liver on its return to the heart, and the veins have no valves.

Although carbonic acid is so very active an agent in the process of animal decomposition, there are others, if not quite so powerful, yet little less important; and one of these is NITROGEN; for all animal substances have a tendency during their decomposition to throw off nitrogen as well as carbon; and this nitrogen may go off either in combination with carbon or with hydrogen: in the latter case it forms ammonia; in the former, it assumes the state of a poisonous gas.† It is therefore as necessary that this decomposing product should be got rid of as the other; this effect is produced by other organs of secretion, and these are THE KIDNEYS.

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* From *hepar* (the liver).

† Cyanogen.

The Kidneys

The *kidneys** are two glandular bodies, they are situated in the lumbar† region; that is, near the lower part of the back,—they are generally surrounded with a more or less adipose or fatty membrane, and consist of three substances, an internal—a middle—and an innermost substance; they have arteries, veins, nerves, muscles, and absorbents; and they are both secreting and execreting organs.

Their Use.

The chief function of the kidneys is to secrete the nitrogenic decomposing products from the blood, and their proper action is equally essential to the continued and due performance of the functions of the other Vital Organs of the body with that of the lungs and the liver; since death invariably follows its suspension, unless some other means be provided by nature (which occasionally happens) for the separation of its characteristic secretion from the blood.

Death does not so speedily ensue when the functional action of the liver and the kidneys is suspended, as when that of the lungs ceases; and it is for this obvious reason, that only *a part* of the whole current of blood flows through the first two organs; and although the circulation of the blood must necessarily be disturbed, when a stagnation in its flow through them takes place, yet its circulation is not actually brought to a stand by this; whereas, in the case of the lungs, *the whole* of the blood meets in them before it can be again circulated through the body: if, therefore, the circulation be stopped there, immediate death ensues, since no more blood can pass on to the heart. The excretory ducts, whereby this secretion is passed from the kidneys, are called ureters; these convey it on to the bladder in the form of urine, and thence it is discharged from the system.

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* Reins.

† From *lumbus* (the loin).

We have seen that two processes are thus constantly carried on in our bodies, that of respiration, by which the animal heat is kept up, and that of restitution, by which the matter consumed in the exercise of the vital functions, and expelled from the body, is restored.

Liebig calculated that the amount of carbon daily burned in the body of an adult man, is about 14 oz., and that the heat given out is fully sufficient to keep up the temperature of the body, and to account for the evaporation of all the gaseous matter and water expelled from the lungs. The carbon is derived from the tissues of the body, which undergo a constant waste; and this is supplied by the food. In the Carnivora, or flesh-eating animals, whose food is almost entirely composed of compounds of protein, albumen, &c., one part is devoted to supply the waste of the tissues of the body, whilst another portion or a corresponding amount of previously existing tissue is decomposed, so as to yield the carbon required for respiration. The tissues can be decomposed only by the exercise of the vital functions, this is the reason why, in the Carnivora, an enormous amount of muscular motion is required to furnish the necessary supply of carbon. On the other hand, the food of the Herbivora, or such animals as live on herbs or vegetables, contains but little of the compounds of protein,—only sufficient to restore the waste of tissues,—while the carbon required for respiration is supplied by the starch, gum, sugar, oil, &c., which form the great mass of their food; and no such amount of muscular motion is required in these, as in the Carnivora.

It is chiefly in the form of bile that the carbon undergoes combustion.

Until Liebig discovered the true function of the bile, the nature of its use was disputed; it was considered by most authors that bile is an excretion intended to be expelled from the body as fœces. But Liebig has shown that only a small portion of the whole amount of the bile can be detected in any shape in the excrement, and that the bile is unquestionably re-absorbed in the intestinal canal, and re-enters the circulation, where it soon disappears; and as the proportion of carbon in the bile is very large, although not sufficient to account for all the carbonic acid given out, there is no reason to doubt that all is gradually consumed by the oxygen of the arterial blood, and converted into carbonic acid and water, which escapes by the lungs and the skin. The food, therefore, and hence the appetite, must be in proportion to the amount of carbon required to supply the animal heat.

Now, in hot climates where the external cooling is less, less heat is required; the appetite is much more feeble; and the usual food, consisting of fruits and vegetables, contains a far smaller amount of carbon than in cold climates, where the appetite is keen and the food highly carbonised, as flesh, or even blubber. For the like reasons more clothing blunts the appetite, by diminishing the loss of heat by external cooling; and those who remove from a cold to a warm climate, always find their appetite fails. This is a warning from Nature to diminish the amount of food taken; and if it were attended to, and the common, but absurd practice of stimulating the appetite, by ardent liquors and hot spices, were abandoned, Europeans might enjoy as good health in the East or West Indies as at home. It is obvious that even in England more food is required in the winter than in summer.

Liebig was the first person who successfully traced chemically the connection between the food, the blood, or the tissues, and the secretions and excretions. He explained the chief organic constituent of bile, and he showed how the tissues, may yield the ingredients of bile and urine, when acted upon by oxygen and water; and that, in endeavouring to explain the formation of bile, it obviously matters not whether we derive it from the albumen, fibrin, &c., of the food, or from those of the tissues, their composition being identical. Liebig stated cholaic acid to be the chief organic constituent of the bile; that, added to urate of ammonia with oxygen and water, it is a component part of blood or flesh; and that protein gives the same product: and thus the tissues, acted upon by oxygen and water, may yield the ingredients of bile and urine. The tissues which are consumed are resolved first into bile and urate of ammonia; the former is secreted by the liver, re-absorbed, and burned as before mentioned; the latter is oxydised, yielding carbonic acid, ammonia, and urea; should the supply of oxygen be insufficient to act on the urate of ammonia, then the uric acid is deposited as urea or calculus.* If the supply of oxygen be somewhat greater, but still deficient, oxalic acid is the result, and mulberry calculus occurs; but if much exercise be taken, and abundance of oxygen supplied, the oxidation of the uric acid is completed, and nothing is left but urea or carbonate of ammonia. In the urine we find soda in moderate quantity, combined with sulphuric and phosphoric acids. This soda is contained in the food; it is necessary for the formation of bile, and is supplied in the form of common salt, and, after contributing to form the bile, it is secreted by the kidneys; but it is never sufficient to neutralise the acids produced, and consequently, there is much ammonia with it; while the urine is acid. Thus we see that, by means of the circulation of the blood, oxygen is conveyed in the arterial blood to every part of the body. This oxygen, acting on the tissues, produces a metamorphosis, by which new soluble compounds are formed. The tissues thus destroyed are replaced by the new matter derived from the food. Meanwhile such of the products of those compounds as contain the principal part of the carbon, are separated from the venous blood in the liver, and yield the bile; while the nitrogen accumulates and is separated from the arterial blood in the kidneys in the form of urea or uric acid. It is thus that Gravel and Calculi* are formed; and therefore we see that indigestion may be the cause of that very serious complaint, STONE IN THE BLADDER.

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* From *calx* (lime or chalk).

There is another purifying, secreting, and excreting glandular organ, which must not be passed over whilst considering the process of digestion, viz. the converting the food into healthy blood, and the maintaining that blood in a healthy state, and that is THE SKIN.

The Skin.

The skin, though seemingly a simple membrane, is not really so; it is laminated, that is, it is composed of several plates or coats, one laid over another. The outermost coat is called the epidermis—scarf-skin—or cuticle; the second, or soft layer, has no English name, but is called ***rete mucosum;*** and is situated between the cuticle and the other coat, containing the colouring particles of the skin, which is not a net-work, nor is it mucus; the third lamina is the cutis, or corium, as distinguished from the epidermis, cuticle, or scarf-skin, to which we arrive by removing the two outer lamina; and it is called the true skin.

Its Use.

The skin seems to be given to man not only for feeling in a general sense, but also for perspiration, absorption, and particularly for touch, and this more especially in the tips of his fingers; it is the seat of various secretions, for each of which it is provided with special organs.

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* From *calculus* (a little pebble or gravel stone).

Of these secretions the most important is Perspiration; this is formed by small glandular organs, some of the internal prolongation of these are from mucous membrane, seated just beneath the cutis, or true skin, and is diffused over the whole surface of the body. The secretion of this fluid by these glands is continually taking place; but since it is usually carried off in the form of vapour as it is secreted, it does not accumulate and become sensible. If, however, from the increased amount of the secretion, or from the condition of the surrounding air, the whole fluid thus poured out should not evaporate, it accumulates in minute drops upon the surface of the skin. Thus this sudoriferous or sweaty secretion may take the form either of *sensible* or *insensible* perspiration; the latter being constant, the former occasional. Only a small portion of the whole fluid which passes off from the surface of the skin may be properly said to be secreted by the sudoriferous glands; the greater part, under ordinary circumstances, being the product of mere evaporation, by which, of course, nothing but pure watery vapour is dissipated. The entire amount of fluid which is insensibly lost from the surface of the skin, varies greatly according to the condition of the atmosphere and that of the body itself; and this influence has a most important effect on the regulation of the temperature of the body.

The secretions by the skin and the secretions by the kidneys are in a measure regulated, the one by the other, with regard to the amount of fluid secreted and discharged from the blood; and there is a similar relation in reference to their function, that of carrying away and getting rid of the products of *waste* in the system.

The share which the skin has to take in this office is greater than is generally supposed; and any cause which checks this excretion throws additional labour on the kidneys; this, of course, tends to produce irregularities in the discharge of their functions. The manner in which the skin is influenced by atmospheric changes, and the means whereby nature operates in cooling the body when necessary, are both simple and effectual. From the whole of its soft, moist surface simple evaporation will take place at all times; and the amount of this is regulated by the warmth and dryness of the atmosphere, as in relation to any other substance. The more readily watery vapour can be dispersed in atmospheric air, the more will be lost from the surface of the body by Evaporation. In cold weather very little is thus carried off, even though the air be dry; and a warm atmosphere already charged with dampness will be nearly as ineffectual.

Mere Evaporation, however, is not the chief means whereby the temperature of the body is regulated. The skin contains a large number of small glands, as already mentioned, and the function of these is to secrete a watery fluid; the amount of the secretion seems to depend chiefly, if not solely, upon the temperature of the surrounding air; therefore, when the external heat is very great, a considerable amount of this *exhaled* fluid oozes from the skin; and this, in evaporating, converts a large quantity of the free caloric into latent heat, which would otherwise raise the temperature of the body. If the atmosphere be hot and dry, and also in motion, exhalation and evaporation go on with great rapidity; if it be cold, both of these are checked, the former entirely so; but if it be dry, although cold, some evaporation still continues. In the other alternative, where a hot atmosphere is saturated with moisture, Exhalation continues, though Evaporation is almost entirely checked; and the fluid poured out by the exhalent glands accumulates on the skin; this is called sweat.

From these facts, we may infer the great importance of not checking exhalation by exposure of the surface of the skin to cold, when the secretion is being actively performed; since a great disturbance of the circulation of the blood will be probably thereby occasioned, similar to that which has been already mentioned, as occurring when other important secretions are suddenly suspended.

The skin is liable to great exhalation from sudden variations of the temperature of the surrounding air; the quantity of watery fluids in the blood-vessels, would thereby be liable to frequent and very injurious changes, if there were not some other means for regulating it. This adjustment is performed by the kidneys, which allow such a portion of water to pass into the urinary tubes as may keep the *pressure* within the vessels at a nearly uniform standard. The quantity of water which is passed off by the kidneys, is governed in a great measure by the exudation from the skin, being greatest when the exhalations from the skin are least, and least when the exhalations from the skin are greatest; but the quantity of *solid* matter to be conveyed away in the secretion has little to do with this, that being dependent on the amount of *waste* in the system, and upon the quantity of surplus nitrogenised aliment which has to be got rid of by the secretion.

It may not be out of place to remark here, that there is a striking analogy between the mode by which the blood-vessels in the kidneys are supplied with blood for the purpose of forming their secretion, and the plan which, as we have seen, is adopted in the liver, in carrying on the hepatic circulation; for as the blood circulated in the liver is conveyed to it by one large vein,* and not directly from the impulsive motion of arterial impetus, so the circulation of the blood in the kidneys is also passed through Venous capillary vessels, not by one large trunk, as in the liver, but by these numerous and very minute veins; and by these it is conveyed to the proper secreting surfaces. These veins may, therefore, be regarded as collectively performing a similar office to that of the vena porta, the large vessel which conveys the blood through the liver; and thus the kidneys may be said to have a Portal system within themselves.

The skin is supplied with numerous glands, called Sebaceous;† these glands are distributed more or less closely throughout the surface of the body; by these an adipose* or fatty secretion is poured forth, which keeps the skin from being dried and cracked by the action of the sun and air.

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* The vena porta.

† From *Sebum* (suet).

Fat. FAT performs a most important part in the animal economy; it nourishes the body when food cannot be procured, or if, when procured, it cannot be digested, or properly assimilated. It is a concrete oily matter, and is contained in the cellular membranes; it is of a white or yellowish colour, and has little or no smell or taste. In infancy it is white, insipid, and has but little solidity. In the adult it is firm and yellowish, having a slight smell and taste.

Fat consists ultimately of carbon, oxygen, and hydrogen, and when secreted from the blood and deposited in the mucous tissues, it exists in the form of drops, and Its Uses. its relation to different parts of the body is various. It is very useful, by its natural operation as well as by its nutritious and life-sustaining properties. It forms a kind of elastic cushion to the orbit in which the eye moves. In the soles of the feet, and in the hips it forms a sort of layer which renders the effects of the weight of the body upon those parts to be less felt; and it answers the like purpose, in diminishing the inconvenience which at times arises from an undue pressure on the skin, and other soft parts. Its presence beneath the skin tends to round the outlines, and decreases the bony and muscular projections in the face, and it assists to confer beauty on the form. As it is a bad conductor of heat, it also contributes to the preservation of the natural temperature of the body; this is the reason why stout persons suffer less by cold in winter than such as are thin. As before remarked, fat serves to nourish the body when food cannot be procured, or when it cannot be properly digested and converted into nutritious blood. This latter contingency may arise in two ways; either by a derangement of the functions of some one or more of the Organs of Digestion, or by the eating of more food than the *waste* of the body has rendered necessary; for it must be borne in mind that life is maintained by opposite influences: a continual wasting of the system, and a constant replenishing of that waste by food, which food must be changed into healthy blood, and assimilated, or actually converted into the real substance—the body.

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* From *adeps* (fat).

Obesity and its Causes.

If the Digestive Organs are in a proper state of action, and an undue accumulation of fat called OBESITY is then produced, it arises solely from a cause which would not have existed had self-control influenced self-gratification.

When Obesity arises from the former cause, it may be disease which no abstinence or self-government could have prevented. The mode of getting rid of Obesity in the one case and in the other, is very different. In the former it may be removed by proper diet and exercise; in the latter, relief must be sought by a resort to such medicine as the unhealthy Organ or Organs, or as the disease that may be influencing the functions of such Organ or Organs, may require.

It is in such cases as this, or in the former contingency, when food cannot be procured, that the beneficence of the Creator, in providing for the emergency by the action of the secretion of fat in the Animal Economy, is so conspicuously displayed; for the fat existing in the body tends to prolong life. The nourishment given out to the blood by the food having ceased, there is either no food, or it is not assimilated, and here the fat is on the spot to supply its place.

The Lymphatics and Absorbent Glands now absorb or suck it up; carry it on and deposit it in the great trunk* just where they deposited the chyle or nutritious part of the food; it there becomes mixed with the current of venous blood on its passage onwards towards the Heart and the Lungs; there it gets purified, and thence it is impelled onward for circulation throughout the body, and thus it conduces to nourish and preserve it.

A consideration of this fact is of no ordinary importance just at this time. A gentleman† happened lately to get so corpulent, "as not to be able to stoop to tie his shoe without considerable pain and difficulty." When he descended the stairs, "he was obliged to go backwards, and slowly, to save the jar of his weight upon the ankle and knee joints." "Going up-stairs," he says, "created another difficulty;" he "was obliged to puff and blow;" he "physiced" himself by what he terms "low living;" "this brought on formidable carbuncles and many obnoxious boils." He then did what he should have done long before,—he consulted an able medical man, one who

* The thoracic duct.

† Mr. Banting.

understands his profession, and by him he was plainly told, "You brought this on yourself by imprudence in diet, and by diet you must be cured." He was cured: and instead of reflecting on himself for having imprudently caused this Obesity, he published his case, abused Fat, called it a name usually considered as one conveying reproach (Parasite); but the term of obloquy is both undeserved and misapplied; for a Parasite is one who *derives* aid or support from another. Fat does just the reverse; fat *imparts* aid, nourishment, and strength to the body.

The temporary clamour now raised against FAT by this publication has a mischievous and injurious tendency. Many persons are led by it to believe fat to be necessarily injurious, whereas it is only the *excess* of it, that is so; and they seem to forget that the difference between *restoring* health, and *preserving* it is very marked. Fat is useful in certain cases: it prolongs life; it contributes to health, to beauty, and to ease. An excess of fat is pernicious; it produces inconvenience and disease—the excess can, in many cases, be prevented;—its removal by change of diet proves it. In certain complaints, purging the body is useful,—it carries off morbid matter. An *excess* of purging is called Diarrhœa. This also is pernicious; it produces prostration of strength, and destroys or diminishes nervous power. The *excess* may be prevented in either case, whether it be Obesity or Diarrhœa; each can be more easily prevented than their effects can be remedied; and in both *prevention is better than cure.*

A moderate secretion of Fat conduces to the facility of motion and improves the beauty of the person. Plumpness, and cheerfulness, or good temper, are generally associated. This may be caused from the fact that ease of body and mind are indispensable for the production of fat. An excess of it is more easily got rid of, than that of any other secretion of animal substance, that is deposited in the human body; and it may be generally effected by exercise and moderate diet. When, however, it is allowed to proceed to *Obesity*, the action of the different organs of digestion is impeded; the calibre of the blood-vessels is contracted; the pulse becomes oppressed, the breathing laborious; there is an accumulation of blood in the head or heart; a general tendency to palpitation or drowsiness, and a constant danger of apoplexy.

Mode of Cure.

In attempting a cure of this disease, for disease it is, when it has been permitted so far to progress, the first step is to avoid all the common and more obvious causes of its origin. A life of indolence and indulgence in the pleasures of the table, must give way to the use of rather severe, though not excessive, regular and habitual exercise,—eider down to a mattress or hard bed; moderate sleep, a somewhat limited and regular supply of dry food, and a use of such medicine as shall act directly on the fluids should be also resorted to; for general Obesity may be considered to be a dropsy of animal oil instead of a dropsy of water. Diet and regimen, with a spare allowance of liquids, will seldom fail to reduce the highest degree of adipose corpulency.

A case in point is noticed in the *Medical Transactions*,* and was an instance much more serious than that of the gentleman above-mentioned, who seems to think that fat is a mere Parasite, which improperly adheres to the human body. It was that of a Mr. Wood, a noted miller who lived at Ballericay, in Essex. Born of parents of intemperate habits, he accustomed himself to indulge in eating, drinking, and indolence, until the 44th year of his age. He then became unwieldy in bulk; was almost suffocated by excess of adipose matter; he endured very ill health from indigestion; and was subject to fits of gout and epilepsy. With great prudence, however, he gradually changed his mode of living, from a highly superfluous, to a very spare diet. He commenced, by diminishing his ale to a pint a day; and by using a much smaller portion of animal food; he found the plan worked wonders, as well in producing a renewed mental vigour, as in restoring strength of body. He continued this course of restricted diet steadily and perseveringly; he went to bed about eight or nine o'clock; rarely slept for more than five or six hours; consequently, he rose early, and he employed himself in laborious exercise of some kind or other, until the time for breakfast; and by this exercise and regimen, he soon reduced himself to the condition of a middle-sized man, with firm flesh, well-coloured complexion, and sound health.

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* Vol. ii. art. xvii.

When Obesity arises from local disease, it is not so easily managed. It may yield to a steady perseverance in the use of a proper regimen and exercise, associated with suitable medicines; but these should be administered under the superintendence of a skilful medical practitioner. Corpulency and plethora must not be considered as one disease. Corpulency is an excessive increase of the body from accumulation of fat. Plethora is a full habit of body, occasioned by an excessive fulness of the blood-vessels.

A due consideration of THE SEVERAL ORGANS OF DIGESTION and of their respective functions, leads to the conclusion that the principal requisites to effect a healthy digestion are—a healthy state of the muscular coat of the stomach—a healthy state of the alimentary canal that passes the food to the stomach, and thence to the bowels—a healthy state of the fluids of the stomach—a proper condition of the bile, and of the intestinal and other fluids, in regard to their respective quantities and qualities; and—a healthy state of the mucous membrane of both the stomach and bowels.

Since on the proper condition, and on the due operation of these organs, and of others that either influence, or are influenced by these, in effecting the proper assimilation of the food, depend the respective issues of health or disease, are not these very important matters?

The Inspired volume, which informs us of the Creation of Man, tells us "that the days of our age are threescore years and ten; and though men be so strong that they come to fourscore years, yet is their strength then but labour and sorrow."—Psalm xc. 10. Surely, therefore, how best to preserve that strength for a proper discharge of the duties of life, so as to enable us bravely to meet its anxieties and contingencies, must be a matter for the gravest consideration, a concern of the highest moment.

The loss of strength occasioned by the wear and tear of the human body is continuous; and this loss is replenished wholly by food. The food, as we have seen, is converted into blood; and by this the system is nourished and supported. Indeed, it is only *by becoming blood*, that food can accomplish this, its grand design. The blood contains all the component parts of man. In a *chemical view*, it may be said the blood is man in a fluid state.

This is not the place to discuss either theological or metaphysical questions,—to comment upon the subtle distinctions, the various and discordant disquisitions of pseudo-philosophers on the respective natures of body and soul—of matter and mind; or to discuss the opinions of such as say these have no distinctive character, —that matter is mind, and mind is matter,—would be here inexpedient. Nevertheless, it is not altogether irrelevant to consider the account of the origin and of the material constituent of man as given us in Holy Writ—

> "And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life, and man became a living soul."—Gen. ii. 7.

There are persons who boldly venture to impugn the truth of this narrative; they cannot comprehend the manner of the performance; therefore they profess scepticism as to the truth of the statement, although they are obliged to admit the existence of man: they have not the courage to attempt to broach any better or other account, they venture not to tell us their opinion of the origin of man. Chemical science, however, here steps in, and bears its evidence to the accuracy of the inspired penman, and lends its aid to support the *possibility* at least of the tale being true. Chemistry proves this fact—there is not one elementary ingredient in the composition of the human body that is not to be found in the earth. With all their professed incredulity, these persons attempt not to deny this. Nor have they the boldness to question the existence of another fact, that man is of "the earth earthy;"—or, that to "dust he must return;"—thereby verifying the further account given us by Moses:—

> "In the sweat of thy brow shalt thou eat bread till thou return unto the ground, for out of it wast thou taken; for dust thou art and unto dust shalt thou return."—Gen. iii. 19.

The Inspired Volume further says:—

> "Then shall the dust return to the earth as it was; and the spirit shall return to GOD who gave it."—Eccles. xx. 7.

Thus we see that, although—

"Life is REAL—Life is EARNEST;"—yet
"The GRAVE is not its GOAL.
Dust thou art—to dust returnest,
Was not spoken of THE SOUL."

LONGFELLOW'S *Psalm of Life.*

It is ANIMAL LIFE alone, and the ANIMAL MIND, that which is common to *man* and *brutes*, that we are now discussing. When we speak of the action of mind on the organs of volition and its influence on the WILL, it is the Animal Mind alone to which reference is made.

To refer to the operation of the Soul—the Immortal part of man,—that part which influences the conscience, and which returns to GOD who gave it, would be very much out of place here.

Since the contingency of either health or disease depends on the purity or impurity of the blood, and as on health or disease respectively depends either the duration or the brevity of life, and as all these are governed by the due discharge of the functions of the "Organs of Digestion," is it not desirable that these should be well understood, and that any information that professes to explain their action and their purposes, be conveyed in a manner which all can comprehend?

It is hoped, that the above explanation of the wonderful machinery by which the DIGESTIVE PROCESS is perfected will enable any reader of ordinary intelligence not only to understand it, but also, that if he meets with a book in which the DIGESTIVE ORGANS are delineated, he will be able readily to distinguish them; and that from the terms in which the information is here conveyed, he will find he can easily comprehend the various and respective offices for which they are designed.

Indigestion.

Opposed to digestion is the disease called INDIGESTION, or Dyspepsia. This is one of the most complicated ailments to which man is liable; it occurs in so many different states of the body, and under such a variety of circumstances; it is accompanied by so many symptoms or sets of symptoms, and these are frequently so diversified, that a careful discrimination of the primary affection is very often exceedingly difficult to be discovered, although this is of the greatest importance.

Its ordinary Symptoms.

The most ordinary symptoms of Indigestion are a coated tongue, flatulence of the stomach, fretfulness or depression of the spirits, occasionally accompanied by a want of appetite, sometimes by vomiting, eructations of various kinds, heartburn, and sudden distensions of the stomach, with spasms.

Their Causes.

These symptoms may be occasioned primarily by disorder or disease of the stomach itself; or they may depend upon the defective function of the liver, bowels, or some other organ, or organs of the body, either remote or adjacent thereto, or in sympathy therewith, such, for instance, as the kidneys; and they are frequently preceded or followed either by Gravel or Gout, or by both.

And Consequences.

Under whatever form the disease appears, and from whatsoever cause it arises, it is attended by a considerable degree of general languor and debility; fatigue by exercise or exertion of any kind; a weak pulse; disturbed sleep; coldness of the extremities; and a tongue furred or covered with a frothy mucus, are its frequent concomitants.

That such should be the unpleasant consequences arising from a morbid condition of the Organs of Digestion and the subsidiary Organs before noticed, may be well imagined when we reflect that each is employed either directly or indirectly, in completing their grand object, viz., that of furnishing a constant supply of nourishment for the whole system, and of converting the food into a component part of the body.

It is very generally supposed that digestion is effected in the stomach alone. This we have seen to be an erroneous opinion; inasmuch as the food is first prepared for the stomach by being mixed with the saliva secreted in the mouth by the process of mastication; that in the stomach it is only broken down and converted into the pultaceous mass called *chyme;* that it then passes on to the small intestines, and being mixed with the bile—the pancreatic and the intestinal juices,—it is there held in solution and formed into a compound mass, that the nutritious part of this mass is for the most part taken up by the Lacteals and Lymphatics there, and is called *chyle;* and that the residue which descends into the larger intestines passes by the mouths of the numerous absorbents there situated; that these drink up whatever small quantity of *chyle* may happen to be left in it; and that the refuse passes off as excrement.

Thus does it appear how extensively the digestive process operates, and from what a number of causes the functional duties of its organs, so closely sympathising with each other, may be retarded, and the disease of Indigestion may proceed.

It will be also remembered that the *chyle,* before it becomes converted into blood and can be actually formed into a component part of the body, must pass on, in connexion with the venous blood, through certain veins to the heart, thence to the lungs, there to come into contact with the atmospheric air, and be changed by it into healthy arterial blood.

Thus it is manifest, that in providing for the sustenance of the system, a connexion subsists between the stomach and the lungs. It is, therefore, obvious that the *chyle*, which originates in the stomach in the form of *chyme*, and which, when converted into healthy *chyle*, communicates a peculiar stimulus to the lungs, as it enters them in combination with the recurrent and exhausted venous blood, should arrive there in a healthy condition; if by any means this peculiar stimulus becomes changed in its quality or character, the lungs may consequently suffer very materially, more especially if they be predisposed to any kind of morbid action.

Pulmonary Consumption.

This, therefore, is frequently the cause of another disease,—a disease named Dyspeptic Phthisis, or that dreadful complaint, commonly called Pulmonary Consumption.

Thus may the effects of a morbid action of the stomach be communicated to the lungs, and lay a foundation for disease, independently of the sympathetic influence which is always found to exist between the extreme links of the chain connecting the various digestive organs, upon the healthy state of which depends the respective consequences of DIGESTION or INDIGESTION.

To write fully on the subject of INDIGESTION, would require much more space than can be allotted to it here. A few general remarks on its causes and on the mode for its prevention, as also for its cure, may, however, be considered as not being out of place.

Causes of Indigestion.

The causes of Indigestion may be classed under two heads, *Local* and *General;* and they may originate in the Digestive Organs, or in some one or more of them, and be principally confined thereto; or they may proceed from a relaxed state of the constitution, arising from causes acting generally on the whole system.

In whatsoever form the disease presents itself, the first thing to be done is to discontinue the course of conduct that laid its foundation. Such conduct may have produced secondary causes, that may be termed either LOCAL REMOTE causes, or GENERAL REMOTE causes.

Local remote causes may be such as a too large indulgence in sedative and diluting substances, as tea, coffee, warm water, or similar liquids; or in stimulant or acrid materials, as opium, ardent spirits, spices, acids, tobacco, whether smoked or chewed, snuffs, a daily habit of unduly distending the stomach by eating or drinking to excess; or, also, either by a rigid abstemiousness, or by very protracted periods of fasting.

General remote causes may be insufficient exercise of the muscular fibres of the body; or of the mental faculties by a sedentary or indolent life; or, on the other hand, Indigestion may arise from an habitual exhaustion of the nervous power by an excessively prolonged application to intense study,—by an unbecoming indulgence in violent passions of any sort, and especially those of a depressing kind, such as fear, grief, undue anxiety, or by a life of too great muscular action, and a general indulgence in dissipation, attended by the habit of keeping late hours.

In the absence of such or the like influences, Dyspepsia is almost unknown, at all events when disease exists not, in some one or more of the Organs of Digestion.

When, however, Dyspepsia has been occasioned by imprudence and allowed to progress, the symptoms that aggravate, and continue the disease should be carefully observed.

The sufferer must always bear in mind, that, although he may have continued past indulgences with a seeming impunity for a time, yet that, since he is now paying the penalty due to former indiscretion, his cure will depend on his pursuing a directly opposite course of action.

Means of Cure.

If severe, long-continued and protracted study has been indulged in, this must give way to daily relaxation, either by walking or riding; and if possible, the mischievous seclusion of the past, must be exchanged for cheerful conversation, and for alteration and change of scene.

If dissipation has been resorted to he must relinquish the habit of keeping late hours, and not only so: he should change his companions and alter his mode of life, by associating only with a few sober and intimate friends.

The hitherto free-liver must be content with plain fare, and to take it at regular and seasonable hours. He must, however, be cautious not to run suddenly into the extreme of abstemiousness; for, if his constitution be enfeebled, this might bring on him some other, and perhaps worse complaint.

It is impossible to lay down a precise rule for diet. Every man differs from every other in age, habit of body, occupation, temperament, and disposition, and each has his particular idiosyncracy or individual peculiarities.

All rational directions for diet must be founded on the especial circumstances of the individual to whom they are addressed; and these must await the test of, and be governed by, his own experience. The most judicious mode of conduct, either for the prevention or for the cure of Dyspepsia, is to limit the stomach to such food as it will most easily digest; to take it in small quantities at a time; to accelerate its removal by occasional mild aperients, that may increase the peristaltic motion, and occasionally to invigorate the Digestive Organs by a tonic medicine that neither immediately nor sensibly excites action like stimulants, nor represses them like sedatives, but a medicine that gives power to the nervous system to generate nervous influence, whereby the whole frame is strengthened, and its energies increased.

A spare diet is not to be recommended; it is seldom found to be serviceable, and it very frequently aggravates the disease; for, as the stomach and bowels have been accustomed to the stimulus of food, if a certain degree of impletion of these be not continued, the tone of the stomach and its muscular powers will not be maintained; its natural function will probably be still further impaired; and if so, this will tend to increase all the feelings of uneasiness which are sought to be removed; hence a moderate excitement and impletion is absolutely necessary. The adjustment of these should be dictated by discretion in determining the nature of the food, and the degree of impletion which best agrees with the stomach, and to the extent only which it will most readily bear; for it must never be forgotten that the primary object in seeking to effect the cure of Dyspepsia, is to endeavour to restore the stomach; or the system at large—where the stomach is only secondarily affected—to its proper tone and strength.

It now remains to consider and practically to apply the previous remarks in reference to the diseases of FLATULENCY, DIARRHŒA, CHOLERAIC DIARRHŒA, and CHOLERA.

Flatulency, and its Causes.

1. *Flatulency.*—This complaint is occasioned by Indigestion: it is caused by air being separated from the solids and fluids, introduced into the stomach as food, and which there creates an *excess* of fermentive action. When the contents of the stomach are perfectly acted upon by the fluids therein secreted, and during a state of health, such fermentation does not arise; but when from any cause the stomach is incapable of duly performing its functions, and the fluids are secreted imperfectly, they lose their corrective power, and an effervescence is soon produced. The gas that is thereby let loose, by distending the stomach, creates very distressing feelings (spasms). The cure of Flatulency depends upon the giving a tone to the muscular fibres of the stomach, and of the intestinal canal.

Its Cure

Diarrhœa, and its Causes.

2. *Diarrhœa, or Looseness of the Bowels.*—This disease arises from an imperfect Digestion of the food, and is produced by an unnatural and increased action in the contraction of the bowels upon themselves, and also by a deranged state of the bowel secretions, whereby loose, liquid, too frequent and rather abundant evacuations, with or without a griping of the bowels, are produced; they are frequently attended by pain. This complaint may be occasioned by irritating materials conveyed into the bowels, either in the food or otherwise; or by a noxious change in the fluids, which are naturally secreted in the bowels themselves; or from an irritable state of the intestines, or of the membrane that lines their inner surface. Diarrhœa may be also occasioned by the sympathy that exists between the bowels and stomach and other organs of the body. Sudden alarm, excitement, arising either from excess of hope or of fear, or from any other affection of the passions, even sudden application of cold or heat to the surface of the skin, may produce Diarrhœa. To many persons, an exposure to damp or cold air, or the getting wet feet, will frequently have the same effect, from the sympathy that exists between the skin and the bowels. Infants are generally affected by it when dentition is difficult. Diarrhœa is the first symptom of DYSENTERY. The cure depends upon the imparting a tone to the muscular membranes of the stomach and of the intestinal canal.

The Cure.

Choleraic Diarrhœa, and its Symptoms.

3. *Choleraic Diarrhœa.*—By Choleraic Diarrhœa is meant, that purging in which the evacuations are very

loose, and colourless, they contain mucus,* and sometimes blood, with little or no smell, and they have the appearance of turbid whey, or rice water; it is preceded by Diarrhœa. Choleraic diarrhœa causes severe griping in the bowels, accompanied by spasms in the stomach, and also by a great exhaustion of strength; this is often followed by the Asiatic, frequently called Spasmodic Cholera.

Spasms are occasioned by a general derangement of the nervous forces. Under certain circumstances this disturbance may be modified by Stimulants; for the proper use of these tends to exalt the natural functions. Stimulants are, however, seldom of permanent efficacy where there is at the bottom a blood disease, of which the Spasmodic paroxysms are only the symptoms. There is a certain point of exhaustion beyond which they are of no avail; for, although stimulants may exalt *nervous force*, they are not able to bestow *vital energy*. A certain amount of nervous force is indispensable for the continuance of life; but if the vital powers themselves are ebbing away, it is impossible then to prolong existence by the use of mere stimulants.

In Choleraic disease, the Choleraic poison impregnates the blood; and to this cause is to be attributed the extremely depressed state of the nervous system and of the vital powers. To counteract this state of depression, it is absolutely essential that the medicine administered shall penetrate the mass of the circulation, so far as may be required to reach the parts on which it is intended to act, there to exert a specific influence on the Choleraic poison, and directly to counteract its influence on the Vascular and Nervous Systems, so as to rally the Vital Powers by what is termed THE LAW of LOCAL ACCESS. This a *mere* stimulant medicine cannot effect.

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* *Slimy* matter.

The mode of Cure.

The change from Choleraic diarrhœa into Cholera is noted by vomitings—painful spasms, or cramps in the limbs—urgent thirst—severe pain about the region of the stomach—a gradual change of the countenance—a sinking of the eyes into the orbits—feebleness of the voice—extreme cold—even the breath is sometimes cold,—a great depression of the pulse; and also at times by an interrupted breathing — by the colour of the body becoming of a dark or purple hue;—and there is also a suppression of most of the secretions.

SUCH IS THE ASIATIC OR SPASMODIC CHOLERA.

PART II.

Medical Science is generally considered under four divisions: the FIRST treats of the properties of organic bodies—of the phenomena they present,—and of the laws which govern their actions; the SECOND investigates the nature of the diseases of the human body; the THIRD arranges these diseases according to their classes, orders, genera, and species; and the FOURTH refers to their treatment, or to the mode of their alleviation or cure.

We are told that soon after his creation MAN became subject to disease—pain and death. When smarting under physical torture, or suffering the anguish and inconveniences that usually accompany many of the various accidents incident to humanity, to obtain relief from the one, and to remedy the effects of the other, were doubtless not only objects of his earnest desire, but also subjects of his anxious thought, and of his frequent ineffectual experimental efforts.

In the earliest ages of time, each man was his own physician—his own surgeon; and this state of things must have long continued. As years rolled on, the necessities of the case impelled or induced Individuals to devote their whole time and attention to these matters. This study was their sole occupation—the main business of their lives. The knowledge thus acquired having been tested by experiment, was at length supplemented by practice; and thus medical science became not only a SCIENCE, but also an ART—*the art of healing.* To these professors and practitioners, mankind resorted as occasion arose; and as is the case in every other art, so in this, repeated experiment promoted extensive and correct information, and facilitated successful achievement. By this means, the healing art was gradually advanced to the high state which it has now attained.

In the study of this science, and in the practice of this art, few persons were more successful than SYDENHAM.

Grainger, in his biography, thus writes of him:—"He was long at the head of his profession; was a physician of great penetration and experience, and went far beyond all his contemporaries in improving the art of physic. He dared to innovate when nature and reason led the way."

Sydenham, in the preface to his *History of Acute and Chronic Diseases,* has stated what he considered to be two DESIDERATA in physic: first, "a true history of diseases; secondly, a certain and established method of cure;" and then he adds, "But if it be asked now whether beside the foregoing desiderata in physic, a third may not be added, viz. the discovery of SPECIFIC remedies? I answer in the *affirmative,* and wish as much as the querist to see it effected; for though that should seem the best method of curing acute diseases which, after nature has pitched upon a certain kind of evacuation, assists her in promoting it, and so necessarily contributes to cure the distemper, it is, nevertheless, to be wished that the cure might be *shortened* by means of SPECIFICS, if any such medicines can be discovered."

The word SPECIFIC is often misunderstood or misapplied. Dr. Swan, in his translation and commentary on Sydenham, thus defines the term:—"It is a medicine possessed of such peculiar virtues, as infallibly to relieve or cure the particular disorder for which it is used, being exhibited as nearly as can be in the same given circumstances." He also says, "It were highly to be "wished we had such a certain and general method of "cure as our author here describes, which might be ac- "quired, one would think, if physicians would unani- "mously set about it in earnest. A want of SPECIFICS "in physic is a complaint of long standing; and yet "no due care has been taken to supply the deficiency. "The best medicines often fail, merely for want of ad- "ministering them judiciously; for supposing them "to have undergone no change for the worse by keep- "ing, or unskilful preparation, it is manifest they must "needs always produce similar effects in nearly the same "given circumstances, so that when they do not, the "fault is not in the medicines, but proceeds from their "being exhibited improperly, without distinguishing "with the accuracy requisite in cases of this nature."

The writer of this Treatise is of the same opinion; he also believes that specifics might be discovered for many diseases, if, after having duly qualified themselves for general practice, medical men, who may be so situated as to have frequent and sufficient opportunities for varied and protracted observation, would devote their close and almost exclusive attention to a particular class or classes of disease; and that, although evacuant medicines may be advantageously resorted to, in some acute diseases where Nature is slow in effectually expelling morbific matter by natural evacuations, yet another mode of treatment is sometimes more eligible, inasmuch as diseases may be cut short in the blood, and disorders may be relieved by medicines that exert a control over vascular or nervous influence, without waiting for, or resorting to the evacuation of the morbific matter. He does not affirm that he has succeeded to the full extent of producing a medicine that will *infallibly* cure the diseases of Flatulency—Diarrhœa—Choleraic Diarrhœa—and Dysentery; but he does state that he has been successful in so far as that the medicine herein mentioned will in *most* instances CURE, and will in *all* cases MITIGATE the suffering of persons afflicted with these complaints, if the medicine be taken in the manner and under the circumstances pointed out. He also further says that when the disease of Cholera has been raging all around, and this medicine has been administered before the precursory symptoms have eventuated in Spasmodic Cholera, the almost invariable consequence has been that the disease has progressed no further.

The occasion which induced the Author to endeavour to find out a remedy for these complaints was this:—In the year 1831, the Asiatic or Spasmodic Cholera raged in London and in many other parts of the United Kingdom. So sudden and unforeseen was its appearance, that all were taken by surprise; and for a time it seemed to baffle every attempt for its repression. He was then the Resident Surgeon at the South London Dispensary, situated in the Southern District of the Metropolis—a locality inhabited by numerous poor and distressed persons, among whom the disease stalked with rapid and fatal strides. By the direction of the Acting Committee of the Institution, its doors were opened day and night for the reception of such persons of this class as might be attacked by bowel complaint or by diarrhœa, and on whom the disease had not so far run its course as to prevent them from leaving their homes; those who were so prevented, were visited at their respective abodes.

The medical profession was unanimously of opinion that Cholera was generally preceded by Diarrhœa; and that if not promptly checked, it soon passed to the next stage of the disease, Choleraic diarrhœa, and thence too frequently to Spasmodic Cholera.

Her Majesty's Privy Council caused *this* to be announced as a fact by placards posted throughout the metropolitan districts.

In the years 1848-9, Asiatic or Spasmodic Cholera again visited London; the same precursory symptoms of the disease were then observed; and it was also noticed that THE DIARRHŒA was generally preceded by FLATUS, or wind in the stomach and intestines.

After a long course of anxious thought and an attentive process of investigation, and of collecting facts, by close observation and cautious experiment, by noticing instances of the peculiar phenomena presented by the anomalous nature of the disease called Spasmodic Cholera one by one, until a sufficient number had been collected to warrant an almost conclusive inference, founded on what may be considered well-nigh a complete induction from which to reason, the writer was fully convinced, that inasmuch as the disease attacked those persons most severely whose nervous system had been weakened by moral or physical causes, and as Choleraic Disease always occasioned a rapid, and a serious depression of the vital powers, *the* DESIDERATUM to baffle the disease was: *To discover some medicine that would* PROMPTLY *impart increased power to the* NERVOUS SYSTEM. *A medicine that, by thus acting—would improve the tone of the system generally—disperse the flatus—cure the diarrhœa—allay anxiety—give confidence to the sufferer—and, counteract the depressing influences of the disease, by rallying the vital energies of the patient. The restoration of the secretion of Bile, and of its flow into the intestinal canal, seemed to him to be of paramount importance.*

The Author observed that a medicine that could only allay the Diarrhœa was insufficient in its operation. The action of mere purgative medicines tended to aggravate the alarming symptoms, and to increase the debility of the patient; inasmuch as the great loss of nervous force, and the speedy depression of the vital powers thereby occasioned, endangered the existence of life. It was, therefore, manifest to him that what was wanted was a medicine that would act on the vascular system, influence the nerves and the ganglionic system, and through it, the heart and the great vessels. That he reasoned correctly, and thereby obtained what he sought for, is proved by the following evidence :—

In the year 1854, the Asiatic or Spasmodic Cholera raged again in London, and in many other parts of the United Kingdom; it also prevailed in the Crimea. Early in the year, the Central Association in Aid of the Wives and Families of our Soldiers then on active service in that part of the world was instituted under Royal patronage at a public meeting in London, General Sir Peregrine Maitland in the chair.

To this Association the writer was an Honorary Surgeon; by it he was brought into contact with a class of persons who, from their social position and habits, were more particularly susceptible to attack by Diarrhœa, Dysentery, and Choleraic disease. Such cases were numerous. To these persons the remedy was administered, and with so universally beneficial an effect, that they earnestly entreated that some of the Globules might be sent out to their husbands and friends. This was accordingly done. Many packages of the medicine were gratuitously forwarded to the Crimea to grateful recipients; and numerous were the acknowledgments of the benefits they had conferred; frequent were the representations of the undiminished estimation in which the medicine was held at the seat of war.

In the Autumn of 1856, this Central Association was dissolved. After its Dissolution, the following communications were received from the Honorary Secretary, the Honourable H. L. Powys, and the Inspecting Officer, Francis Partridge, Esq., respectively:—

"CENTRAL ASSOCIATION IN AID OF THE WIVES AND FAMILIES OF SOLDIERS ORDERED ON ACTIVE SERVICE,

"9 Waterloo Place, Pall Mall,
"January 13th, 1857.

"Sir,

"I am authorised by the Committee of the Central Association to tender to you their thanks for your exertions so kindly and gratuitously rendered, and so effectually carried out.

"Your most obedient Servant,
"(Signed) H. L. POWYS, Major.
Hon. Sec.

"To George Franks, Esq."

"September 29th, 1856.

"Dear Sir,

"My connexion with the Central Association as its Inspecting Officer having ceased, owing to the restoration of peace, I am anxious to convey to you how valuable your services have been to a great number of the wives and children of the soldiers employed at the seat of war; they express themselves most grateful for your unremitting attention to them, and supplying them gratuitously with medicine and other comforts; and it appears you did not confine your care to themselves only, but you also extended your kindness to many of their husbands and relatives at the seat of war, by sending them out medicine, which they informed me was of the greatest service and benefit to them when attacked by the prevailing epidemic.

"I have mentioned these facts, considering it is due to you, and that it will be pleasing to you to know that the persons you have benefited were grateful for the assistance you had rendered them.

"I am, dear Sir, faithfully yours,
"(Signed) FRANCIS PARTRIDGE,
"Late Inspecting Officer, C.A.

"GEORGE FRANKS, Esq., Surgeon,
"90 Blackfriars Road."

The circumstance of this medicine having been used in the HOSPITALS AT THE CRIMEA, and also in HER MAJESTY'S NAVY, occasioned the following corroborating testimony to its efficacy and to its general success:—

"Camp before Sebastopol,
"June 22nd, 1855.

"Hospital Sergeant E. Rayment, 88th regiment, is very anxious to return Mr. Franks his most sincere thanks for the box of his Globules: with Surgeon Wall's permission they have been used with decided advantage in relaxed state of bowels brought on by the effects of climate, and acting upon peculiar constitutions: in Diarrhœa and Dysentery and laxity of the Bowels they are decidedly beneficial from their efficacy in imparting a tone, and from their being decidedly styptic, and even specific in their action upon peculiar conditions of the bowels.

"I am, Sir,
"Your most humble and obliged servant,
"(Signed) E. RAYMENT,
"Hospital Sergeant H.M. 88th regt.

"To——FRANKS, Esq.,
"London."

From Dr. George Everest, *Surgeon of H.M. Ship "Algiers."*

"H.M.S. *Algiers*, off Sebastopol.

"Dear Sir, "August 9th, 1855.

"The box of Capsules (Globules) you were good enough to forward me I have tried in several cases of Diarrhœa occurring on board the *Algiers*, and with considerable success. We have not had since their receipt either Cholera or Choleraic Diarrhœa; but should these complaints show themselves, your medicine shall be again used, and the result sent you.

"Yours most sincerely,

"(Signed) GEO. EVEREST.

"George Franks, Esq."

Extract from a letter addressed to Antonio Brady, Esq., of the Admiralty, by Lieutenant Glinn; dated H.M.S. *Algiers*, off Sebastopol, 18th August, 1855:—

"Franks' Diarrhœa Capsules (Globules) have cured me and about thirty-five of our officers and men; it (the medicine) has been sent out here on trial to our medical men, and it has answered to perfection. We sent some to the Rifles officers, and they are equally pleased: they are a great boon to persons once attacked."

From Dr. John Andrews, *Senior Staff Surgeon in the* Crimea.

"Royal Naval Hospital, Lisbon,

"My dear Sir, "7th July, 1856.

"I cannot but feel very grateful to you for your very kind attention in sending me your preparation for Diarrhœa; and the more so, as it reached me most opportunely, as Cholera is now prevalent here. I assure you, from the experience I had of its efficacy when in the Black Sea last year, I lost no time in not only administering it myself to every case of Diarrhœa which presented itself, but I distributed a supply to Her Majesty's Envoy and Consul here, and besides its power in immediately stopping Choleraic Diarrhœa, its possession morally fortifies the minds of many with confidence, and supplies them with great comfort. I regret to say that, from the great many excitements and employments when in the Black Sea, I kept account of no particular case, but I can with truth assert that it never failed me, and even this morning I was called to a case of Choleraic Diarrhœa, and administered a Globule with complete success. I offer you my warmest thanks for the supply; a further one would be acceptable.

"I am, my dear Sir,
"Very faithfully yours,
"JOHN ANDREWS.

"Dr. George Franks."

The following testimony in regard to the efficacy of this medicine in the Mercantile Marine service, and as further medical vouchers for its worth, are here set forth. Much more of like import is omitted for want of space; it may, however, be mentioned, that this medicine has been successfully administered in India and China.

From W. H. Bennett, Esq., *Surgeon to the Screw Steamer "Chersonese."*

"Cardington Street, Hampstead Road,
"October 4th, 1856.

"My dear Sir,

"Allow me to express my unqualified opinion of the efficacy of your Choleraic Globules. I gave them with most satisfactory results in several cases of Diarrhœa that occurred on board, during my late voyage. One case in particular I would mention. One of our firemen was attacked with very severe Diarrhœa, accompanied with vomiting and spasmodic pains over the abdomen. After trying the usual remedies adapted to such cases, I administered one of your globules, which relieved him very speedily, and the man was able to resume his duty in a very short time. I can only say that I should never think of going to sea again without some of them, as I think they are an invaluable medicine, and particularly suited for voyages. Accept, my dear Sir, my sincere thanks for the supply you gave me, and

"I am,
Yours very truly,
"W. H. R. BENNETT, M.R.C.S., Eng.

"To George Franks, Esq.,
"90 Blackfriars Road."

"2 Wellington Terrace, Price Street,
"Birkenhead,
"December 1st, 1856.

"My dear Sir,

"I beg to forward to you another instance, in which your Choleraic Globules have proved very efficacious.

Prior to my leaving England for America, I gave Mrs. Hutchings one of the small boxes containing three Globules; shortly afterwards she heard of her father, Admiral Hollingworth, being very ill from Diarrhœa, which continued in spite of remedies. Mrs. H. sent two of the Globules to him by post: he took one directly they reached him, and with almost immediate relief. The admiral keeps the other always at hand in the event of a return of the disease. I consider these Globules a great boon to the Medical Profession as well as to the public.

"Believe me, my dear Sir,

"Yours truly,

"W. H. R. BENNETT, M.R.C.S. Eng.
"Late Surgeon to the screw steamer *Chersonese.*
"GEORGE FRANKS, Esq.,
"90 Blackfriars Road."

These Testimonials verify the success of the Medicine. It not only cures Diarrhœa and Choleraic Diarrhœa, it also imparts nervous energy to the Patient, it gives him confidence, and it speedily, very speedily restores him to health. This was the Desideratum sought.

One complaint for which this medicine is intended, and to which reference is made in some of the above letters, remains to be noticed,—that is, DYSENTERY.

Dysentery may be either Acute or Chronic: it commences with Diarrhœa.. Acute Dysentery is attended by frequent griping evacuations, painful and constant urgency to relieve the bowels, with discharge of mucus* only and in small quantity, mixed with blood, the natural fœces being retained or voided in small, compact, hard substances; also by loss of appetite, and by nausea. It is sometimes preceded by flatulency, sickness of the stomach, and slight vomiting, and it comes on with chills, succeeded by heat of the skin, and by frequency of the pulse. When the diseased action begins to affect the lower part of the intestinal canal, the evacuations become more frequent, less abundant and more urgent; and in passing through its diseased parts they occasion much pain, so that every evacuation is preceded by severe griping. As the disease proceeds to a chronic state, it frequently happens that a portion of the bowels is protruded, which proves to be a troublesome and a distressing symptom in the progress of the disease, as does the constant inclination to relieve the bowels without the ability of voiding any thing, except, perhaps, a little mucus. More or less fever attends the disease; in some cases the febrile state wholly disappears after a time, while the proper Dysenteric symptoms will be probably of long continuance.

Ten years have passed away since the above letters were written; throughout this interval of time this medicine has been continuously applied for, and extensively, and successfully administered in the above-mentioned complaints, to all classes of persons. Its specific remedial qualities and its speedy restorative action on the system have been thus thoroughly tested.

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* *Slimy* matter.

Hitherto the medicine has been prescribed in consultation, or directly supplied only on a special application. This is not discontinued; but in addition thereto, it is now introduced as a PATENT MEDICINE under the name of "FRANKS' ALLOPATHIC GLOBULES," "for the cure of Diarrhœa, Choleraic Diarrhœa, Dysentery, and to prevent Cholera;" and it may be procured (by order) of all respectable Dealers in Medicines, either in London or in the Country, in Packets, price 2s. 9d. each: so that by this means it is accessible to all—spurious imitation is in a measure checked (for by the exercise of due vigilance a purchaser may readily discover imposition, should it be attempted);—protection from unskilful preparation is secured;—and it can be always kept at hand, whether a person be within the reach of medical aid or not. In travelling, or to residents in the colonies, this is a matter of very great importance. Indeed, it is just the plan advised by the Board of Health when the Cholera raged in England in 1854-5.

The unthinking or the interested, frequently talk as if they believed the mere name of Patent disparages a Medicine; they seem to forget the device is a fiscal contrivance to increase the revenue, and that the envelope of a stamp can in no way affect the contents. If the Medicine be worthless, the stamp will not improve it; if it be really what it professes to be, the stamp deteriorates not from its efficiency; the stamp gives it a currency as being genuine, and is a guarantee for uniformity in the preparation, and that is all.

A sound mind in a healthy body is the greatest earthly blessing that Providence has allotted to man,—a trite saying; it, however, expresses a fact. Without this—Wealth is unenjoyed—Honours are uncared for—Luxuries pall on the sense. Disease occasions privation of comfort, both mental and physical; it produces prostration of strength, and incompetence for intellectual pleasures; causes inattention to business, loss of money, care, anxiety, and irritability of temper.

A healthy state of the body depends upon a healthy state of the blood; the blood, being purified, depends on the life-giving oxygen it receives from the atmosphere in the act of breathing. If, then, the air we breathe be not pure, the blood will necessarily become tainted. The blood is formed from the food. If the food be not nutritious, and the water which is drunk be not pure, disease will be the inevitable consequence. The purity or impurity of the blood is also affected by the cleanliness or the impurity of the skin. That the skin secretes impurities from the blood, and that some of these are excreted or carried off from the skin by insensible perspiration, has been already noticed. If, however, the perspiration be increased, or the evaporation be checked, these impurities collect on the surface of the skin, and when allowed to remain, they are often again absorbed, and thus cause troublesome ailments; proper ablutions, and a frequent change of linen, are the preventives. An attention to the cleanliness of the person and of the clothes,—the latter, effected by often airing and exposing them to ventilation,—are of much more importance in promoting and maintaining health than is generally supposed; for the clothes frequently imbibe noxious exhalations from the skin, which, if not removed, may cause infectious and distressing disease.

There is yet another requisite for the promotion and maintenance of the health,—one, perhaps of as much importance as either of those above mentioned,—and that is EXERCISE; the advantages arising from the exercise of the body are too much disregarded. The atmosphere, being the grand purifier and regenerator of the blood, supplies it with its vital principle. Bodily exercise expands the human frame; it brings the respiratory muscles into play, and stimulates to increased respiration. This causes impure air to be thrown off from the lungs in increased quantities; and by the law of mutual diffusion above-mentioned an equal quantity of pure air is inhaled, and thereby the state of the blood is improved. Healthy persons, whether old or young, should be much in the open air. It is too cold to go out to-day, is a frequent exclamation. This is a great mistake: it is never too cold for out-of-door exercise for a person in health. If the weather be cold, let additional clothing be called into requisition. If the wind blow, the cloak may be wrapped tighter. If the frost be severe, a quick walk or a good run will exercise the muscles of the limbs. The due warmth of the body may be maintained in all states of the weather. If the shoes be stout and the feet kept dry, no harm will accrue, even should the weather be stormy. An early change of such garments as may have become damp, will always prevent any unpleasant consequences.

An attention to house ventilation, by keeping the bedroom windows open and the bed clothes thrown back and exposed to the action of the air during the day, is also very necessary.

A sound Mind depends in a great measure on TEMPERANCE. The terms Temperance and Intemperance are too frequently supposed to refer only to moderation or excess either in Eating or Drinking, or in both; but this is a very inadequate, and by far too narrow a construction of the meaning of these words. Men may be either temperate or intemperate in other matters. It must be remembered that if the Mind is to be kept in a healthy state, it must be exercised in a proper regulation of the passions, and in the keeping these under proper control. The Mind and the Body are so intimately connected, that one necessarily acts and re-acts on the other. If the one be unduly disturbed, the other will be correspondingly disordered; therefore, to regulate the passions, desires, and feelings, in subservience to the dictates of Religion, Reason, and Common Sense,—neither to be improperly elated by prosperity, nor to be unreasonably dejected by adversity,—to resist the blandishments of luxury and ease on the one hand, and manfully to brave the stormy waves of trouble on the other—and to observe the golden mean in every condition in which we may happen to be placed, are more difficult, but not less important exercises of Temperance than the mere adherence to moderation in the use of what are frequently termed the enjoyments of Life or good cheer. Be Temperate in ALL things, is an injunction from high authority.

If every prudent precautionary step that may have been taken to ward off the disease has been unsuccessful, and the attack does come, then to manifest a calm determination to bear it patiently—to possess a quiet hope in the success of the remedial measures adopted for its removal, and—to place a firm trust in an over-ruling Providence, will be the best, indeed it is the only means whereby to maintain a healthy state of the Mind, so as to conduce to a restoration of health, or to afford a rational consolation in all the exigencies of Life, under the contingencies to which humanity is liable. This is all that Man can do; and having done this, the event must be left with Him who gave that life—who has hitherto preserved it—and whose blessing alone can render effectual ANY remedies that may be resorted to, in the hope that by their use it may be prolonged.

NOTICES OF THE PRESS

On the First Edition of this Work.

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* * * "The plainest common sense is alone required to the comprehension of this unpretending little volume. Certain premonitory attacks, under extreme heat and in atmospheric conditions not unusual at this time of year, are apt to receive their full development in the dreaded cholera; but check these preliminary affections, and in the vast majority of cases, the fatal termination is prevented. It is to attain this object that the author directs his efforts. He has devised a remedy, of the component parts of which we are, of course, not informed, but we are assured that for years it proved very beneficial in private practice, and was since employed by some medical men in the Crimea and elsewhere. There are certificates from these gentlemen, all of a highly satisfactory character. The invention seems to have been equally successful, whenever tried, whether in military hospitals, on board Queen's ships, steam transports, in the mercantile marine service both in India and China, and in reference to the series of ailments for the cure of which it is specially intended, diarrhœa, choleraic diarrhœa, and dysentery, and the dreaded Asiatic cholera itself.

"But it is not physical medicaments alone that are necessary in such cases; under the depressing influences of the class of diseases in question, the nervous system becomes affected, and mental energy—the great sustaining agent—gives way. On this subject the remarks of Mr. Franks are perhaps the most useful amongst the many useful contained in his little volume. There is much originality and a very high tone of feeling in this portion of the work. * * * We believe that persons in general will be very grateful for the new application he has made of hygienic art, and the admirable, because plain and intelligible, dissertation in which Mr. Franks treats his subject. We are sure we ought all to feel under great obligations to him, and we beg him to accept our best thanks."—*Morning Post.*

"Cholera is now in possession of part of London, and men are, very naturally and very wisely, arming themselves beforehand with information on the subject in case the epidemic should unhappily spread. We the more readily, therefore, direct attention to the little shilling book which Mr. Franks has issued on the question. Whether or no medical men concur in his method of treatment—and on this point there are sure to be many opinions—it must at least be confessed, that his hygienic and preventive directions are beyond cavil. His book is intended for general perusal; and we trust in the present crisis it will be extensively read. The state of body predisposing to cholera is clearly and tersely explained; and the remedy which the author offers has been prepared by the light of an experience extending over five-and-thirty years. Mr. Franks was resident surgeon of the South London Dispensary, in 1831; and he treated cholera, not only in that year, but in 1848 and 1854, when the epidemic raged in London. He has, therefore, a right to be heard; and the evidence of the success of the remedy is derived from quarters the authority of which is beyond question. Even if the reader should, fortunately, escape the disease which now threatens the metropolis, he cannot fail to learn much on the question of general regimen from this unpretending but useful little work."—*Standard.*

"This will be found a most useful work at all times, and more especially in the event of any fulfilment of the predictions respecting an early visitation of cholera."—*Observer.*

"The author foresees a visitation of cholera, and with the humanity characteristic of his honourable profession, he labours to impress upon the public the value of the maxim, that 'prevention is better than cure.' Nothing could be sounder than the advice he gives, and it is communicated in a pleasant popular style, and free from technicalities; so that the treatment he prescribes, the value of which has been tested in many climates, may be as readily comprehended by the patient as by the physician."—*Star.*

"This work treats on the means of preventing the scourge of cholera, by pointing out how its premonitory symptoms may be recognised, and how checked in their pristine stages. It also points out the diagnosis of cholera itself, how that disease affects the vital parts and causes death, and what may be done to avert the mortal extremity. The writing displays very considerable intelligence."—*Clerkenwell News.*

"Acting on the wise caution that 'Prevention is better than cure,' Mr. Franks has published his useful and admonitory work, which gives much valuable information on the questions of diet and health, and which will assist any guided by its counsels to the employment of security against the fear of approaching epidemics."—*Wesleyan Times, April* 16*th*, 1866.

"This valuable little pamphlet will repay a close perusal."—*Reading Mercury*, *April* 14*th*, 1866.